

**ATTACHMENT B. PROPOSED CALFED ACTIONS EVALUATED
IN THE MULTI-SPECIES CONSERVATION STRATEGY**

Table B-1. Delta Region: Proposed CALFED Actions Evaluated in the Multi-Species Conservation Strategy

Multi-Species Conservation Strategy (MSCS) User Guide: This table presents a summary of the Preferred Alternative and Common Program targets and actions identified in the Programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the Delta Region that are evaluated and covered under the MSCS. A description of the types of CALFED targets and actions not covered under the MSCS is presented in Chapter 4, Section 4.1.1. As described in Chapter 4, Section 4.1.1, the MSCS analyzes the Summary Programmatic Action Outcomes (summary outcomes), which embody all of the targets and actions listed for each summary outcome (shown in the third and fifth table columns, respectively). Table 4-1 summarizes the summary outcomes analyzed in the MSCS by CALFED region. Each summary outcome is assigned a unique code (e.g., E1). The second column identifies the Ecosystem Restoration Program (ERP) ecological management zone in which targets and actions could be implemented. A unique action code has been assigned to each action and is shown in the fourth column.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Ecosystem Restoration Program				
E1. Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Sacramento-San Joaquin Delta	Provide a March outflow that occurs from the natural late-winter and early-spring peak in inflow from the Sacramento River. The outflow should be at least 20,000 cubic feet per second (cfs) for 10 days in dry years, at least 30,000 cfs for 10 days in below-normal years, and 40,000 cfs for 10 days in above-normal water years. Wet-year outflows are generally adequate under the present level of development.	E010101	Prescribed outflows in March should be met by the cumulative flows of prescribed flows for the Sacramento, Feather, Yuba, and American Rivers. It will be necessary to obtain assurances (e.g., limit Delta diversions) that these prescribed flows will be allowed to contribute to Delta outflow. A portion of the inflow would be from base (minimum) flows from the east Delta tributaries and the San Joaquin River and its tributaries.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Sacramento–San Joaquin Delta	Provide a late-April-to-early-May outflow that emulates the spring inflow from the San Joaquin River. The outflow should be at least 20,000 cfs for 10 days in dry years, 30,000 cfs in below normal years, and 40,000 cfs in above normal years. These flows would be achieved through base flows from the Sacramento River and flow events from the Mokelumne, Calaveras, Stanislaus, Tuolumne, and Merced Rivers.	E010102	Prescribed outflows in late April and early May should be met by the cumulative flows of prescribed flows from the Stanislaus, Tuolumne, and Merced Rivers (see East San Joaquin Basin Ecological Zone), and Mokelumne and Calaveras Rivers (see Eastside Delta Tributaries Ecological Zone). It will be necessary to obtain assurances that these prescribed flows will be allowed to contribute to Delta outflow. The flow event would be made up of base flows from the Sacramento River, its tributaries, and the Cosumnes River, plus Mokelumne, Calaveras, and San Joaquin tributary pulsed flows prescribed under the May 1995 Water Quality Control Plan, and by additional supplemental flows.
		Provide a fall or early winter outflow that emulates the first “winter” rain through the Delta.	E010103	Allow the first “significant” natural flow into the Delta (most likely from rainfall or from unimpaired flows from tributaries) and lower watersheds below storage reservoirs or from flows recommended by the California Department of Fish and Game (DFG) and Anadromous Fish Restoration Program (AFRP) to pass through the Delta to the San Francisco Bay by limiting water diversions from the Delta for up to 10 days. (No supplementary release of stored water from reservoirs would be required above that required to meet flows prescribed by DFG and AFRP.)

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Sacramento-San Joaquin Delta	Provide a minimum flow of 13,000 cfs on the Sacramento River below Sacramento in May of all but critical years (U.S. Fish and Wildlife Service 1997).	E010104	Supplement flows in May of all but critical years as needed from Shasta, Orville, and Folsom Reservoirs to maintain an inflow of 13,000 cfs to the Delta.
E4. Provide more natural Delta hydraulic conditions (internal flow and velocity patterns) by altering channel configurations (e.g., setback levees) and physical barriers to channel flow.	Sacramento-San Joaquin Delta	Reestablish more natural internal Delta water flows in channels.	E010601	Reduce velocities in selected Delta channels by increasing cross-sectional areas of channel via setback levees or by constricting flows into and out of the channels.
			E010602	Restrict tidal flow and cross-Delta transfer of water to south Delta pumping plants to selected channels to lessen flow through other channels.
			E010603	Manage the operation of existing physical barriers so that resulting hydraulics upstream and downstream of the barrier are more similar to levels in the mid-1960s.
			E010604	Close the Delta Cross Channel (DCC) when opportunities allow, as specified in the 1995 Water Quality Control Plan and recommended by the U.S. Fish and Wildlife Service (USFWS) (U.S. Fish and Wildlife Service 1995), in the period from November through January when appropriate conditions trigger closure (i.e., internal Delta exports are occurring).

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E4. Provide more natural Delta hydraulic conditions (internal flow and velocity patterns) by altering channel configurations (e.g., setback levees) and physical barriers to channel flow.	Sacramento–San Joaquin Delta	Maintain net downstream flows in the mainstem San Joaquin River from Vernalis to immediately west of Stockton during the period from September through November to help sustain dissolved oxygen levels and water temperatures sufficient for upstream migrating adult fall-run chinook salmon.	E010605	Operate a fully operational barrier at the head of Old River in the period from August through November.
		Restore 50–100 miles of tidal channels in the southern Yolo Bypass within the north Delta, while maintaining or improving the flood carrying capacity of the Yolo Bypass. (Note: This target is in addition to targets and programmatic actions presented in the Delta Sloughs habitat section.)	E010606	Construct a network of channels within the Yolo Bypass that connect Putah and Cache Creek sinks, and potentially the Colusa drain to the Delta. Channels should effectively drain all flooded lands in the bypass after floodflows cease entering the bypass from Fremont and Sacramento weirs. Channels would maintain a base flow through the spring to allow juvenile anadromous and resident fish to move from rearing and migratory areas.
		Restore 50–100 miles of tidal channels in the southern Yolo Bypass within the north Delta, while maintaining or improving the flood carrying capacity of the Yolo Bypass. (Note: This target is in addition to targets and programmatic actions presented in the Delta Sloughs habitat section.)	E010607	Reduce flow constrictions in Yolo Bypass such as openings in the railway causeway that parallel Interstate 80.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E5a. Restoration of up to 7,500 acres of tidal shallow-water habitat.	Sacramento–San Joaquin Delta	Expand the floodplain area in the North, East, South, and Central and West Delta Ecological Units by incorporating approximately 10% of leveed lands into the active floodplain of the Delta.	E010401	Convert leveed lands to tidal wetland/slough complexes in the North Delta Ecological Unit. Permanently convert island tracts (Little Holland, Liberty, and Prospect) at the south end of the Yolo Bypass to tidal wetlands/slough complexes. Convert small tracts along Snodgrass Slough to tidal wetland/slough complexes. Construct setback levees along Minor, Steamboat, Oxford, and Elk Sloughs.
			E010402	In the East Delta Ecological Unit, construct setback levees along the South Mokelumne River and connecting dead-end sloughs (Beaver, Hog, and Sycamore).
			E010403	Convert deeper subsided (sunken) lands between dead-end sloughs in the East Delta Ecological Unit east of the South Mokelumne River channel to overflow basins and nontidal wetlands or land designated for agricultural use.
			E010404	Remove levees that inhibit tidal and floodflows in the headwater basins of east Delta dead-end sloughs (Beaver, Hog, and Sycamore) and allow these lands to be subject to flood overflow and tidal action.
			E010405	Construct setback levees in the South Delta Ecological Unit along the San Joaquin River between Mossdale and Stockton.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E5a. Restoration of up to 7,500 acres of tidal shallow-water habitat.	Sacramento–San Joaquin Delta	Expand the floodplain area in the North, East, South, and Central and West Delta Ecological Units by incorporating approximately 10% of levied lands into the active floodplain of the Delta.	E010406	Convert adjacent lands along the San Joaquin River between Mossdale and Stockton to overflow basins and nontidal wetlands or land designated for agricultural use.
		Restore 1,500 acres of shallow-water habitat in the North Delta Ecological Unit; 1,000 acres of shallow-water habitat in the East Delta Ecological Unit; 2,000 acres of shallow-water habitat in the South Delta Ecological Unit; and 2,500 acres of shallow-water habitat in the Central and West Delta Ecological Unit.	E010407	Construct setback levees on corners of Delta islands along the San Joaquin River channel in the Central and West Delta Ecological Unit. Open levied lands to tidal action where possible along the margins of West Delta Ecological Unit.
			E010901	Restore 500 acres of shallow-water habitat at Prospect Island in the North Delta Ecological Unit.
			E010902	Restore 1,000 acres of shallow-water habitat in the downstream (south) end of the Yolo Bypass (Little Holland and Liberty Island) within the North Delta Ecological Unit.
			E010903	Restore 1,000 acres of shallow-water habitat at the eastern edge of the East Delta Ecological Unit where existing land elevations range from 5 to 9 feet below mean sea level.
			E010904	Restore 2,000 acres of shallow-water habitat at the south and eastern edge of the South Delta Ecological Unit where existing land elevations range from 5 to 9 feet below mean sea level.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E5a. Restoration of up to 7,500 acres of tidal shallow-water habitat.	Sacramento–San Joaquin Delta	Restore 1,500 acres of shallow-water habitat in the North Delta Ecological Unit; 1,000 acres of shallow-water habitat in the East Delta Ecological Unit; 2,000 acres of shallow-water habitat in the South Delta Ecological Unit; and 2,500 acres of shallow-water habitat in the Central and West Delta Ecological Unit.	E010905	Restore 2,500 acres of shallow-water habitat in the Central and West Delta Ecological Unit where existing land elevations range from 5 to 9 feet below mean sea level. A program of fill placement or longer-term subsidence reversal may be needed to accomplish this action.
		Restore 500 acres of shoals in the western-most portion of the Central and West Delta.	E010906	Implement a sediment management program which results in deposition and accretion within portions of Central and West Delta channels and bays, forming 500 acres of shallow shoal habitat restored to tidal influence.
		Manage existing and restored dead-end and open-ended sloughs and channels within the Sacramento-San Joaquin Delta Ecological Zone so that the total surface area of these sloughs and channels covered by invasive non-native aquatic plants is reduced.	E015201	Conduct large-scale, annual weed eradication programs throughout existing and restored dead-end and open-ended sloughs and channels within each of the Delta's ecological units so that less than 1% of the surface area of these sloughs and channels is covered by invasive non-native aquatic plants within 10 years.
		Reduce the potential for introducing non-native aquatic plant and animal species at border crossings.	E015202	Provide funding to the California Department of Food and Agriculture to expand the current State border inspection process to include a comprehensive program of exclusion, detection, and management of invasive aquatic species such as the zebra mussel, purple loosestrife, and hydrilla.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E8. Restoration of 30,200–45,800 acres of tidal fresh emergent wetland.	Sacramento–San Joaquin Delta	Expand the floodplain area in the North, East, South, and Central and West Delta Ecological Units by incorporating approximately 10% of leveed lands into the active floodplain of the Delta.	E010401	Convert leveed lands to tidal wetland/slough complexes in the North Delta Ecological Unit. Permanently convert island tracts (Little Holland, Liberty, and Prospect) at the south end of the Yolo Bypass to tidal wetlands/slough complexes. Convert small tracts along Snodgrass Slough to tidal wetland/slough complexes. Construct setback levees along Minor, Steamboat, Oxford, and Elk Sloughs.
			E010402	In the East Delta Ecological Unit, construct setback levees along the South Mokelumne River and connecting dead-end sloughs (Beaver, Hog, and Sycamore).
			E010404	Remove levees that inhibit tidal and floodflows in the headwater basins of east Delta dead-end sloughs (Beaver, Hog, and Sycamore) and allow these lands to be subject to flood overflow and tidal action.
			E010405	Construct setback levees in the South Delta Ecological Unit along the San Joaquin River between Mossdale and Stockton.
			E010407	Construct setback levees on corners of Delta islands along the San Joaquin River channel in the Central and West Delta Ecological Unit. Open leveed lands to tidal action where possible along the margins of West Delta Ecological Unit.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E8. Restoration of 30,200–45,800 acres of tidal fresh emergent wetland.	Sacramento–San Joaquin Delta	Restore 50–100 miles of tidal channels in the southern Yolo Bypass within the north Delta, while maintaining or improving the flood carrying capacity of the Yolo Bypass. (Note: This target is in addition to targets and programmatic actions presented in the Delta Slough habitat section.)	E010606	Construct a network of channels within the Yolo Bypass that connect Putah and Cache Creek sinks, and potentially the Colusa drain to the Delta. Channels should effectively drain all flooded lands in the bypass after floodflows cease entering the bypass from Fremont and Sacramento weirs. Channels would maintain a base flow through the spring to allow juvenile anadromous and resident fish to move from rearing and migratory areas.
		Restore ecological structure and functions of the Delta waterways network by increasing the land-water interface ratio a minimum of 50%–75% compared to 1906 conditions and by restoring 100–150 miles of small distributary sloughs (less than 50–75 feet wide) hydrologically connected to larger existing Delta channels. (Note: This target is in addition to the Delta slough target presented in the target section for Delta Channel Hydraulics.)	E011101	To replace lost slough habitat and provide high-quality habitat areas for fish and associated wildlife, the short-term solution for the Central and West Delta Ecological Unit is to restore 20 miles of slough habitat and the long-term solution is to restore 50 miles of slough habitat; in both the North Delta and East Delta Ecological Units, the short-term solution is to restore 10 miles of slough habitat and the long-term solution is to restore 30 miles of slough habitat; and in the South Delta Ecological Unit, the short-term solution is to restore 25 miles of slough habitat and the long-term solution is to restore 50 miles of slough habitat.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E8. Restoration of 30,200–45,800 acres of tidal fresh emergent wetland.	Sacramento–San Joaquin Delta	Restore ecological structure and functions of the Delta waterways network by increasing the land-water interface ratio a minimum of 50%–75% compared to 1906 conditions and by restoring 100–150 miles of small distributary sloughs (less than 50–75 feet wide) hydrologically connected to larger existing Delta channels. (Note: This target is in addition to the Delta slough target presented in the target section for Delta Channel Hydraulics.)	E011102	Restore tidal action to portions of islands and tracts in the North and East Delta Ecological Units with appropriate elevation, topography, and hydrogeomorphic conditions to sustain tidally influenced freshwater emergent wetland with 20–30 linear miles of narrow, serpentine shaped sloughs within the wetlands and floodplain.
		Maintain existing channel islands and restore 50–200 acres of high-value islands in selected sloughs and channels in each of the Delta's ecological units.	E011201	Actively protect and improve existing channel islands in the Delta.
			E011202	Restore 50–200 acres of channel islands in each of the Delta's ecological management units where channel islands once existed.
		Increase existing tidal emergent wetland habitat in the Delta by restoring 30,000–45,000 acres of lands designated for floodplain restoration.	E011401	Develop tidal freshwater marshes in the North Delta Ecological Management Unit.
			E011402	Develop tidal freshwater marshes on small tracts of converted leveed lands along Snodgrass Slough.
			E011403	Develop tidal freshwater marshes along the upper ends of dead-end sloughs in the east Delta.
			E011404	Develop tidal freshwater marshes along all setback levees and levees with restored riparian habitat.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E8. Restoration of 30,200–45,800 acres of tidal fresh emergent wetland.	Sacramento–San Joaquin Delta	Increase existing tidal emergent wetland habitat in the Delta by restoring 30,000–45,000 acres of lands designated for floodplain restoration.	E011405	Develop tidal freshwater marshes on restored channel island habitat.
		Reduce the potential for introducing non- native aquatic plant and animal species at border crossings.	E015202	Provide funding to the California Department of Food and Agriculture to expand the current State border inspection process to include a comprehensive program of exclusion, detection, and management of invasive aquatic species such as the zebra mussel, purple loosestrife, and hydrilla.
E9. Maintenance of existing and restoration of 200–800 acres of channel islands and associated habitats.	Sacramento–San Joaquin Delta	Maintain existing channel islands and restore 50–200 acres of high-value islands in selected sloughs and channels in each of the Delta's ecological units.	E011201	Actively protect and improve existing channel islands in the Delta.
			E011202	Restore 50–200 acres of channel islands in each of the Delta's ecological management units where channel islands once existed.
		Limit dredging in channel zones that are not essential for flood conveyance or maintenance of industrial shipping pathways, and avoid dredging activities in shallow water areas (<3 meters mean high water) except where it is needed to restore flood conveyance capacity.	E015002	Restrict or minimize effects of dredging activities near existing midchannel tule islands and shoals that are vulnerable to erosion and exhibit clear signs of area reduction in response to channel and bar incision (cutting).

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E9. Maintenance of existing and restoration of 200–800 acres of channel islands and associated habitats.	Sacramento–San Joaquin Delta	Reduce boat traffic and boat speeds in areas where levees or channel islands and their associated shallow-water and riparian habitat may be damaged by wakes. This will protect important Delta habitats such as berm islands from erosion caused by boat wakes.	E016001	In the Central and West Delta Ecological Unit, establish and enforce no-wake zones of 1–3 miles in Disappointment Slough, 1–2 miles in White Slough, and 3–4 miles in Middle and Old Rivers in areas with remnant berms and midchannel islands.
			E016002	In the East Delta Ecological Unit, establish and enforce no-wake zones of 1–3 miles of the Mokelumne River, 2–4 miles in Snodgrass Slough, and 3–4 miles in Beaver, Hog, and Sycamore Sloughs in areas with remnant berms and midchannel islands.
E10a. Restoration of 698–1,576 acres of tidal sloughs.	Sacramento–San Joaquin Delta	Manage existing and restored dead-end and open-ended sloughs and channels within the Sacramento-San Joaquin Delta Ecological Zone so that the total surface area of these sloughs and channels covered by invasive non-native aquatic plants is reduced.	E015201	Conduct large-scale, annual weed eradication programs throughout existing and restored dead-end and open-ended sloughs and channels within each of the Delta's ecological units so that less than 1% of the surface area of these sloughs and channels is covered by invasive non-aquatic plants within 10 years.
		Reduce the potential for introducing non-native aquatic plant and animal species at border crossings.	E015202	Provide funding to the California Department of Food and Agriculture to expand the current State border inspection process to include a comprehensive program of exclusion, detection, and management of invasive aquatic species such as the zebra mussel, purple loosestrife, and hydrillia.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E10a. Restoration of 115–260 miles (698–1,576 acres) of tidal sloughs.	Sacramento–San Joaquin Delta	Restore ecological structure and functions of the Delta waterways network by increasing the land-water interface ratio a minimum of 50%–75% compared to 1906 conditions and by restoring 100–150 miles of small distributary sloughs (less than 50–75 feet wide) hydrologically connected to larger existing Delta channels. (Note: This target is in addition to the Delta slough target presented in the target section for Delta Channel Hydraulics.)	E011101	To replace lost slough habitat and provide high-quality habitat areas for fish and associated wildlife, the short-term solution for the Central and West Delta Ecological Unit is to restore 20 miles of slough habitat and the long-term solution is to restore 50 miles of slough habitat; in both the North Delta and East Delta Ecological Units, the short-term solution is to restore 10 miles of slough habitat and the long-term solution is to restore 30 miles of slough habitat; and in the South Delta Ecological Unit, the short-term solution is to restore 25 miles of slough habitat and the long-term solution is to restore 50 miles of slough habitat.
			E011102	Restore tidal action to portions of islands and tracts in the North and East Delta Ecological Units with appropriate elevation, topography, and hydrogeomorphic conditions to sustain tidally influenced freshwater emergent wetland with 20–30 linear miles of narrow, serpentine shaped sloughs within the wetlands and floodplain.
E11. Restoration of up to 19,600 acres of nontidal freshwater emergent wetland.	Sacramento–San Joaquin Delta	Expand the floodplain area in the North, East, South, and Central and West Delta Ecological Units by incorporating approximately 10% of levied lands into the active floodplain of the Delta.	E010403	Convert deeper subsided (sunken) lands between dead-end sloughs in the East Delta Ecological Unit east of the South Mokelumne River channel to overflow basins and nontidal wetlands or land designated for agricultural use.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E11. Restoration of up to 19,600 acres of nontidal freshwater emergent wetland.	Sacramento-San Joaquin Delta	Expand the floodplain area in the North, East, South, and Central and West Delta Ecological Units by incorporating approximately 10% of levied lands into the active floodplain of the Delta.	E010406	Convert adjacent lands along the San Joaquin River between Mossdale and Stockton to overflow basins and nontidal wetlands or land designated for agricultural use.
		Develop 500 acres of deep open-water areas (more than 4–6 feet deep) within restored fresh emergent wetland habitats in the Delta to provide resting habitat for water birds, foraging habitat for diving ducks and other water birds and semiaquatic mammals that feed in deep water, and habitat for associated resident pond fish species.	E011001	Develop 100 acres of open-water areas within restored fresh emergent wetland habitats in the West and Central Delta Ecological Unit such as on Twitchell or Sherman islands.
			E011002	Develop 200 acres of open-water areas within restored fresh emergent wetland habitats in the East Delta Ecological Unit.
			E011003	Develop 200 acres of open-water areas within restored fresh emergent wetland habitats in the South Delta Ecological Unit.
		Develop 2,100 acres of shallow, open-water areas (less than 4–6 feet deep) in restored fresh emergent wetland habitat areas in the Delta to provide resting, foraging, and brood habitat for water birds and habitat for fish and aquatic plants and semiaquatic animals.	E011004	Develop 500 acres of shallow, open-water areas within restored fresh emergent wetland habitats in the Central and West Delta Ecological Unit such as on Twitchell or Sherman Islands.
			E011005	Develop 300 acres of shallow, open-water areas within restored fresh emergent wetland habitats in the East Delta Ecological Unit.
			E011006	Develop 300 acres of shallow, open-water areas within restored fresh emergent wetland habitats in the South Delta Ecological Unit.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E11. Restoration of up to 19,600 acres of nontidal freshwater emergent wetland.	Sacramento–San Joaquin Delta	Develop 2,100 acres of shallow, open-water areas (less than 4–6 feet deep) in restored fresh emergent wetland habitat areas in the Delta to provide resting, foraging, and brood habitat for water birds and habitat for fish and aquatic plants and semiaquatic animals.	E011007	Develop 1,000 acres of shallow, open-water areas within restored fresh emergent wetland habitats in the North Delta Ecological Unit.
		Restore a total of 3,000 acres of nontidal freshwater marshes in the North and the East Delta Ecological Management Units; restore 4,000 acres of nontidal fresh emergent wetland in the South Delta Ecological Management Unit as part of a subsidence control program; and restore 10,000 acres of nontidal fresh emergent wetland in the Central and West Delta Ecological Management Unit as part of a subsidence control program.	E011301	Restore 1,000 acres of nontidal fresh emergent wetland on Twitchell Island.
			E011302	Restore 1,000 acres of nontidal emergent wetland in the Yolo Bypass.
			E011303	Restore 1,000 acres of nontidal emergent wetlands in levied lands designated for floodplain overflow adjacent to the dead-end sloughs in the East Delta Ecological Unit.
			E011304	Restore 4,000 acres of nontidal emergent wetlands in the South Delta in lands designated for floodplain overflow.
			E011305	Restore 10,000 acres of nontidal wetlands on Delta Islands of the Central and West Delta Ecological Unit.
E13a. Enhancement of up to 4,000 acres of existing and restoration and management of up to 28,000 acres of seasonal wetlands for wildlife.	Sacramento–San Joaquin Delta	Expand the floodplain area in the North, East, South, and Central and West Delta Ecological Units by incorporating approximately 10% of levied lands into the active floodplain of the Delta.	E010403	Convert deeper subsided (sunken) lands between dead-end sloughs in the East Delta Ecological Unit east of the South Mokelumne River channel to overflow basins and nontidal wetlands or land designated for agricultural use.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E13a. Enhancement of up to 4,000 acres of existing and restoration and management of up to 28,000 acres of seasonal wetlands for wildlife.	Sacramento–San Joaquin Delta	Expand the floodplain area in the North, East, South, and Central and West Delta Ecological Units by incorporating approximately 10% of levied lands into the active floodplain of the Delta.	E010406	Convert adjacent lands along the San Joaquin River between Mossdale and Stockton to overflow basins and nontidal wetlands or land designated for agricultural use.
		Restore and manage at least 4,000 acres of additional seasonal wetland habitat and improve management of 1,000 acres of existing degraded seasonal wetland habitat in the North Delta Ecological Unit.	E011501	Improve management of 1,000 acres of existing, degraded seasonal wetland habitat in the Yolo Bypass.
			E011502	Restore and manage 2,000 acres of additional seasonal wetland habitat in association with the Yolo Bypass Wildlife Area.
		Restore and manage at least 6,000 acres of additional seasonal wetland habitat and improve management of 1,000 acres of existing degraded seasonal wetland habitat in the East Delta Ecological Management Unit.	E011503	Develop a cooperative program to restore and manage 1,000 acres of additional seasonal wetland habitat on Canal Ranch.
			E011504	Develop a cooperative program to restore and manage 5,000 acres of additional seasonal wetland habitat.
			E011505	Improve management of 1,000 acres of existing degraded seasonal wetland habitat.
		Restore and manage at least 8,000 acres of additional seasonal wetland habitat and improve management of 1,500 acres of existing degraded seasonal wetland habitat in the Central and West Delta Ecological Unit.	E011506	Restore and manage 4,000 acres of additional seasonal wetland habitat on Twitchell Island.
			E011507	Restore and manage 4,000 acres of additional seasonal wetland habitat on Sherman Island.
			E011508	Develop a cooperative program to improve management of 1,500 acres of existing degraded seasonal wetland habitat.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E13a. Enhancement of up to 4,000 acres of existing and restoration and management of up to 28,000 acres of seasonal wetlands for wildlife.	Sacramento–San Joaquin Delta	Restore and manage at least 12,000 acres of additional seasonal wetland habitat and improve management of 500 acres of existing degraded seasonal wetland habitat in the South Delta Ecological Unit.	E011509	Develop a cooperative program to restore and manage 12,000 acres of additional seasonal wetland habitat.
			E011510	Develop a cooperative program to improve management of 500 acres of existing degraded seasonal wetland habitat.
		Increase populations of amphibians, particularly tiger salamanders and spadefoot toads, by increasing natural flood plains, stream meander, seasonal pools, and perennial grasslands.	E017201	Restore at least five core areas of suitable habitat, each consisting of about 500 acres in each of the ecological management units.
			E017202	Enhance existing poor habitats and restore new habitats in historical wetlands, grasslands, and upland areas.
E15a. Restoration of 1,195–1,284 acres of riparian habitat along up to 85 miles of channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.	Sacramento–San Joaquin Delta	More frequently achieve mean daily water temperatures between 60°F and 65°F in the Delta channels in spring and fall to meet the temperature needs of salmon and steelhead migrating through or rearing in the Delta.	E010501	Improve riparian (bankside) woodland habitats along migrating channels and sloughs of the Delta.
			E010502	Improve shaded riverine aquatic (SRA) habitat along migration routes in the Delta.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15a. Restoration of 1,195–1,284 acres of riparian habitat along up to 85 miles of channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.	Sacramento–San Joaquin Delta	Restore 50–100 miles of tidal channels in the southern Yolo Bypass within the north Delta, while maintaining or improving the flood carrying capacity of the Yolo Bypass. (Note: This target is in addition to targets and programmatic actions presented in the Delta Sloughs habitat section.)	E010606	Construct a network of channels within the Yolo Bypass that connect Putah and Cache Creek sinks, and potentially the Colusa drain to the Delta. Channels should effectively drain all flooded lands in the bypass after floodflows cease entering the bypass from Fremont and Sacramento weirs. Channels would maintain a base flow through the spring to allow juvenile anadromous and resident fish to move from rearing and migratory areas.
		Restore ecological structure and functions of the Delta waterways network by increasing the land-water interface ratio by a minimum of 50%–75% compared to 1906 conditions and by restoring 100–150 miles of small distributary sloughs (less than 50–75 feet wide) hydrologically connected to larger existing Delta channels. (Note: This target is in addition to the Delta slough target presented in the target section for Delta Channel Hydraulics.)	E011101	To replace lost slough habitat and provide high-quality habitat areas for fish and associated wildlife, the short-term solution for the Central and West Delta Ecological Unit is to restore 20 miles of slough habitat. The long-term solution is to restore 50 miles of slough habitat. In both the North Delta and East Delta Ecological Management Units, the short-term solution is to restore 10 miles of slough habitat. The long-term solution is to restore 30 miles of slough habitat. In the South Delta Ecological management Unit, the short-term solution is to restore 25 miles of slough habitat and the long-term solution is to restore 50 miles of slough habitat.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15a. Restoration of 1,195–1,284 acres of riparian habitat along up to 85 miles of channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.	Sacramento–San Joaquin Delta	Restore ecological structure and functions of the Delta waterways network by increasing the land-water interface ratio by a minimum of 50%–75% compared to 1906 conditions and by restoring 100–150 miles of small distributary sloughs (less than 50–75 feet wide) hydrologically connected to larger existing Delta channels. (Note: This target is in addition to the Delta slough target presented in the target section for Delta Channel Hydraulics.)	E011102	Restore tidal action to portions of islands and tracts in the North and East Delta Ecological Units with appropriate elevation, topography, and hydrogeomorphic conditions to sustain tidally influenced freshwater emergent wetland with 20–30 linear miles of narrow, serpentine shaped sloughs within the wetlands and floodplain.
		Maintain existing channel islands and restore 50–200 acres of high-value islands in selected sloughs and channels in each of the Delta's ecological units.	E011201	Actively protect and improve existing channel islands in the Delta.
			E011202	Restore 50–200 acres of channel islands in each of the Delta's ecological management units where channel islands once existed.
		Restore 10–20 linear miles of riparian and riverine aquatic habitat along the San Joaquin River in the South Delta Ecological Unit to create corridors of riparian vegetation of which 50% is greater than 75 feet wide and 40% is no less than 300 feet wide and 1 mile in length.	E011601	Develop a cooperative program to restore riparian habitat by obtaining conservation easements or by purchase from willing sellers.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15a. Restoration of 1,195–1,284 acres of riparian habitat along up to 85 miles of channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.	Sacramento–San Joaquin Delta	Restore 15–25 linear miles of riparian and riverine aquatic habitat along other Delta island levees throughout the South Delta Ecological Unit to create corridors of riparian vegetation of which 60% is more than 75 feet wide, with 10% no less than 300 feet wide and 1 mile long.	E011602	Develop a cooperative program to restore riparian habitat by obtaining conservation easements or by purchase from willing sellers.
		Restore 10–15 linear miles of riparian and riverine aquatic habitat along the Sacramento River below Sacramento of which 40% is to be more than 75 feet wide and 20% more than 300 feet wide.	E011603	Obtain conservation easements for, or purchase from willing sellers, land needed to restore 10–15 linear miles of riparian habitat along the Sacramento River in the North Delta Ecological Unit. Obtain conservation easements for, or purchase from willing sellers, land needed to create corridors of riparian vegetation.
		Restore 8–15 linear miles of riparian and riverine aquatic habitat in the East Delta Ecological Unit of which 40% is to be more than 75 feet wide and 20% over 300 feet wide.	E011604	Obtain conservation easements for, or purchase from willing sellers, land needed to restore 5–10 linear miles along the Mokelumne River and 3–5 miles along the Cosumnes River in the East Delta Ecological Unit to create corridors of riparian vegetation.
		Restore or plant riparian and riverine aquatic habitats in association with actions to recreate slough habitat and set back levees.	E011605	Obtain conservation easements for, or purchase from willing sellers, land needed to restore riparian habitat along newly created sloughs and sloughs with new levee setbacks.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15a. Restoration of 1,195–1,284 acres of riparian habitat along up to 85 miles of channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.	Sacramento–San Joaquin Delta	Restore or plant riparian and riverine aquatic habitats in association with actions to recreate slough habitat and set back levees.	E011606	Obtain conservation easements for, or purchase from willing sellers, land needed to restore riparian habitat along new or upgraded Delta levees.
		Protect existing riparian woodlands in the North, East, and South Delta Ecological Units.	E011607	Expand the Stone Lakes and Cosumnes River Preserves from their current size by an additional 500 acres of existing woodland habitat. Share costs with the Nature Conservancy to acquire in fee-title the lands needed from willing landowners.
			E011608	Purchase riparian woodland property or easements.
		Restore 10–20 linear miles of riparian and riverine aquatic habitat in the North Delta Ecological Management Unit of which 40% is to be more than 75 feet wide and 20% over 300 feet wide.	E011609	Obtain conservation easements from willing sellers, land needed to restore 5–10 linear miles along Steamboat Slough as part of the development of a North Delta habitat corridor.
		Increase shoreline and floodplain riparian habitat in the Delta by modifying current vegetation maintenance practices on both the water and land side of berms on 25–75 miles of the Sacramento, Mokelumne, and San Joaquin Rivers, and on 25–100 miles of other Delta channels and sloughs confined by levees.	E014901	Enter into agreements with willing levee reclamation districts to implement modified levee and berm vegetation management practices that promote establishment and maturation of shoreline riparian vegetation to restore and maintain the health of aquatic resources in and dependent on the Delta. Reimburse districts for any additional maintenance and inspection costs.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15a. Restoration of 1,195–1,284 acres of riparian habitat along up to 85 miles of channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.	Sacramento–San Joaquin Delta	Reduce surface area covered by non-native plants to less than 1%.	E015301	Control non-native riparian plants.
		Reduce the aerial extent of invasive non-native woody species, such as Giant Reed (i.e., arundo or false bamboo) and eucalyptus, that compete with native riparian vegetation by reducing the aerial extent of non-natives by 50% throughout the Delta and eradicating invasive woody plants from restoration areas.	E015302	Implement a program throughout the Delta to remove and suppress the spread of invasive non-native plants that compete with native riparian vegetation by reducing the aerial extent of species such as false bamboo, eucalyptus, and non-native cordgrass by 50%.
		Restore 4,000–6,000 acres of perennial grasses in the North, East, South, and Central and West Delta Ecological Units associated with existing or proposed wetlands and floodplain habitats.	E015303 E011801	Implement a program throughout the Delta that, prior to taking restoration actions, eliminates invasive woody plants, which could interfere with the restoration of native riparian vegetation. Develop a cooperative program to restore 1,000 acres of perennial grassland in the North Delta Ecological Unit through conservation easement or purchase from willing sellers.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15a. Restoration of 1,195–1,284 acres of riparian habitat along up to 85 miles of channels, restoration of riparian habitat in association with setback levees, protection of 500 acres of existing riparian forest, and reduction of current invasive riparian plants by 50%.	Sacramento–San Joaquin Delta	Restore 4,000–6,000 acres of perennial grasses in the North, East, South, and Central and West Delta Ecological Units associated with existing or proposed wetlands and floodplain habitats.	E011802	Develop a cooperative program to restore 1,000 acres of perennial grassland in the East Delta Ecological Unit through conservation easement or purchase from willing sellers.
			E011803	Develop a cooperative program to restore 1,000–2,000 acres of perennial grassland in the South Delta Ecological Unit through either conservation easement or purchase from willing sellers.
E16a. Restoration of 4,000–6,000 acres of perennial grassland.	Sacramento–San Joaquin Delta	Restore 4,000–6,000 acres of perennial grassland in the North, East, South, and Central and West Delta Ecological Units associated with existing or proposed wetlands and floodplain habitats.	E011804	Develop a cooperative program to restore 1,000–2,000 acres of perennial grassland in the Central and West Delta Ecological Units through either conservation easements or purchase from willing sellers.
		Increase populations of amphibians, particularly tiger salamanders and spadefoot toads, by increasing natural flood plains, stream meander, seasonal pools, and perennial grasslands.	E017201	Restore at least five core areas of suitable habitat, each consisting of about 500 acres in each of the ecological management units.
			E017202	Enhance existing poor habitats and restore new habitats in historical wetlands, grasslands, and upland areas.
E17. Protection and enhancement of 50–100 acres of inland dune scrub.	Sacramento–San Joaquin Delta	Enhance 50–100 acres of low- to moderate-quality Antioch inland dune scrub habitat in the Delta to provide high-quality habitat for special-status plant and animal species and other associated wildlife populations.	E011701	Support programs for protecting and restoring inland dune scrub habitat at existing ecological preserves in the Central and West Delta Ecological Units.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E17. Protection and enhancement of 50–100 acres of inland dune scrub.	Sacramento–San Joaquin Delta	Enhance 50–100 acres of low- to moderate-quality Antioch inland dune scrub habitat in the Delta to provide high-quality habitat for special-status plant and animal species and other associated wildlife populations.	E011702	Protect and restore inland dune scrub habitat areas adjacent to existing ecological preserves in the Central and West Delta Ecological Units through conservation easements or purchase from willing sellers.
E18a. Cooperative management of 40,000–75,000 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.	Sacramento–San Joaquin Delta	Cooperatively manage 40,000–75,000 acres of agricultural lands.	E011901	Increase the area of Delta corn fields and pastures flooded in winter and spring to provide high-quality foraging habitat for wintering and migrating waterfowl and shorebirds and associated wildlife.
			E011902	Periodically flood the pasture from October through March in portions of the Delta relatively free of human disturbance to create suitable roosting habitat for wintering greater sandhill crane and other wintering sandhill crane subspecies.
			E011903	Create permanent or semipermanent ponds in farmed areas of the Delta that provide suitable waterfowl nesting habitat, but lack suitable brooding habitat, to increase resident dabbling duck production.
			E011904	Increase the acreage farmed for wheat and other crop types that provide suitable nesting habitat for waterfowl and other ground nesting species in the Delta.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E18a. Cooperative management of 40,000–75,000 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.	Sacramento–San Joaquin Delta	Cooperatively manage 40,000–75,000 acres of agricultural lands.	E011905	Convert agricultural lands in the Delta that are farmed from crop types that have relatively low forage value for wintering waterfowl, wintering sandhill cranes, and other wildlife to production of crop types that provide greater forage value.
			E011906	Defer fall tillage on corn fields in the Delta to increase the available forage for wintering waterfowl, wintering sandhill cranes, and associated wildlife.
			E011907	Develop a cooperative program to improve management on 8,000 acres of corn and wheat fields in the Delta and to reimburse farmers for leaving a portion of the crop in each field unharvested to provide forage for waterfowl, sandhill cranes, and other wildlife.
		Maintain present populations with no further declines in size by ensuring that waterways known to be used by giant garter snakes have water in them year around.	E007101	Maintain existing natural habitats that have available water all year and identify key habitats in agricultural areas for special management.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E19. Restoration of flood refuge habitat areas for wildlife along levees and other lands adjacent to existing and restored habitat areas.	Sacramento–San Joaquin Delta	Increase the populations and distribution of upland game.	E014401	Provide high ground adjacent to current and expanded habitat with cover for protection from floods. Existing flood control levees adjacent to agricultural lands could be utilized for this escape habitat in this area to provide sufficient vegetative growth of grasses, forbs, and shrubs to lower predation pressure during these times and when adjacent lands are fallow.
E20. Reduction in the adverse effects of dredging on estuarine aquatic habitats.	Sacramento–San Joaquin Delta	Limit dredging in channel zones that are not essential for flood conveyance or maintenance of industrial shipping pathways, and avoid dredging activities in shallow water areas (<3 meters mean high water) except where it is needed to restore flood conveyance capacity.	E015001	Use alternate sources (rather than Delta in-channel sources) of levee maintenance material, such as excavation of abandoned nonessential levees, excavation material from the restoration of secondary tidal channels, dry-side island interior borrow pits, upland borrow sites, Cache Creek settling basin and Yolo Bypass sediment deposits, and deep-water dredging sites in the San Francisco Bay.
			E015002	Restrict or minimize effects of dredging activities near existing midchannel tule islands and shoals that are vulnerable to erosion and exhibit clear signs of area reduction in response to channel and bar incision (cutting).
		Avoid dredging during spawning and rearing periods for delta smelt and rearing periods for winter-run chinook salmon.	E015003	Follow DFG guidelines for dredging in the estuary.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E20. Reduction in the adverse effects of dredging on estuarine aquatic habitats.	Sacramento–San Joaquin Delta	Avoid dredging during spawning and rearing periods for delta smelt and rearing periods for winter-run chinook salmon.	E015004	Provide stockpiles of levee maintenance materials in three or more selected land side areas to avoid the need to obtain material from Delta channels during restricted periods.
E21. Reduction in the probability of introduction and establishment of non-native aquatic species into the Bay-Delta.	Sacramento–San Joaquin Delta	Reduce or eliminate the influx of non-native aquatic species in ship ballast water.	E015401	Fund additional inspection staff to enforce existing regulations.
			E015402	Help fund research on ballast water treatment techniques, which could eliminate non-native species before ballast water is released.
		Reduce the potential for introducing non-native aquatic organisms at border crossings.	E015403	Provide funding to the California Department of Food and Agriculture to expand the current State border inspection process to include a comprehensive program of exclusion, detection, and management of invasive aquatic species such as the zebra mussel.
E22. Reduction in the adverse effects of diversions on fish.	Sacramento–San Joaquin Delta	Reduce loss of important fish species at diversions.	E014701	Consolidate and screen agricultural diversions in the Delta.
			E014702	Replace or upgrade the screens at the State Water Project (SWP) and Central Valley Project (CVP) intakes with positive barrier, fish bypass screens and state-of-the-art fish holding and transportation systems.
			E014703	Upgrade screens at Pacific Gas & Electric Company's (PG&E's) Contra Costa Power Plant with fine-mesh and positive-barrier fish bypass screens.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E25. Reduction in the adverse effects of harvest on fish and wildlife populations.	Sacramento–San Joaquin Delta	Reduce illegal harvest of anadromous fish and wildlife in the Delta by increasing enforcement effort.	E015801	Provide additional funding to DFG for additional enforcement.
			E015802	Provide additional funding to the local county sheriff's departments and State and local park agencies to support additional enforcement efforts.
			E015803	Provide rewards for the arrest and conviction of fish and wildlife poachers.
E27a. Reduction in the concentrations and loadings of contaminants in the aquatic environment by 25%–50%.	Sacramento–San Joaquin Delta	Reduce loading, concentrations, and bioaccumulation of contaminants of concern to ecosystem health in the water, sediments, and tissues of fish and wildlife in the Sacramento–San Joaquin Delta Ecological Zone by 25%–50% as measured against current average levels.	E015701	Reduce the input of herbicides, pesticides, fumigants, and other agents toxic to fish and wildlife in the Delta by modifying land management practices and chemical dependency on 50,000 acres of urban and agricultural lands that drain untreated into Delta channels and sloughs. Actions will focus on modifying agricultural practices and urban land uses on a large-scale basis. To reduce the concentration of pesticide residues, the amount applied will be reduced and the amount of pesticide load reaching the Delta's aquatic habitats will be further reduced by taking advantage of biological and chemical processes within wetland systems, which can help break down harmful pesticide residues.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E27a. Reduction in the concentrations and loadings of contaminants in the aquatic environment by 25%–50%.	Sacramento–San Joaquin Delta	Reduce loading, concentrations, and bioaccumulation of contaminants of concern to ecosystem health in the water, sediments, and tissues of fish and wildlife in the Sacramento–San Joaquin Delta Ecological Zone by 25–50% as measured against current average levels.	E015702	Reduce levels of hydrocarbons and other contaminants entering the Delta foodweb from elevated releases into the estuary at oil refineries.
E28. Reduction in the adverse effects of boat wakes on shoreline habitats and wildlife in sensitive habitat areas.	Sacramento–San Joaquin Delta	Reduce boat traffic and boat speeds in areas where levees or channel islands and their associated shallow-water and riparian habitat may be damaged by wakes. This will protect important Delta habitats such as berm islands from erosion caused by boat wakes.	E016001	In the Central and West Delta Ecological Units, establish and enforce no-wake zones of 1–3 miles in Disappointment Slough, 1–2 miles in White Slough, and 3–4 miles in Middle and Old Rivers in areas with remnant berms and midchannel islands.
			E016002	In the East Delta Ecological Unit, establish and enforce no-wake zones of 1–3 miles of the Mokelumne River, 2–4 miles in Snodgrass Slough, and 3–4 miles in Beaver, Hog, and Sycamore Sloughs in areas with remnant berms and midchannel islands.
		Reduce boat wakes near designated important California black rail nesting areas in the Delta from March to June to levels necessary to prevent destruction of nests to assist in recovery of this listed species.	E016003	Establish and enforce no-wake zones within 50 yards of important California black rail nesting areas in the Delta from March to June.
			E016004	Establish and enforce no-motorized-boating zones in 5–25 miles of existing dead-end channels in the Delta from March to June.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E28. Reduction in the adverse effects of boat wakes on shoreline habitats and wildlife in sensitive habitat areas.	Sacramento–San Joaquin Delta	Reduce boat wakes near designated important California black rail nesting areas in the Delta from March to June to levels necessary to prevent destruction of nests to assist in recovery of this listed species.	E016005	Establish and enforce no-motorized-boating zones in the small tidal channels created in restored tidal fresh emergent wetlands and Delta floodplains of levee setbacks.
		Reduce boat wakes near important shallow-water spawning areas in the Delta from March to June to levels necessary to protect successful spawning behavior. This will help in the recovery of listed species.	E016006	Identify important shallow-water spawning areas and establish and enforce no wake zones within 50 yards of these important Delta habitats from March to June.
E31. Establish additional populations of Sacramento perch.	Sacramento–San Joaquin Delta	Evaluate the status and biology of the Sacramento perch to determine if restoration of wild populations within its native range is feasible.	E017001	Complete a thorough status review of the Sacramento perch and develop a plan for its long-term preservation in the Central Valley. Establish at least one population in the Delta.
Levee System Integrity Program				
L1. Improvement and maintenance of Delta levees.	Sacramento–San Joaquin Delta	Improve Delta levee system stability to meet Public Law (PL) 84-99 criteria.	L010101	Modify levee cross-sections by raising levee height, widening levee crown, flattening levee slopes, and/or constructing stability berms.
		Maintain Delta levees to the PL 84-99 standard.	L010102	Develop a long-term maintenance plan.
		Improve levee stability in key Delta locations to a level commensurate with the benefits which the levees protect.	L010201	Modify levee cross-sections by raising levee height, widening levee crown, flattening levee slopes, and/or constructing stability berms in key Delta locations.
		Maintain improved levees.	L010202	Develop a long-term maintenance plan.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
L1. Improvement and maintenance of Delta levees.	Sacramento–San Joaquin Delta	Develop the capability to efficiently respond to multiple concurrent levee breaks within the Delta.	L010301	Implement a comprehensive reconstruction, repair, and maintenance program for Delta levees with a fleet of specialized equipment so that a viable Delta levee industry can be reestablished.
L2. Reduction in the risk to levee stability from subsidence.	Sacramento–San Joaquin Delta	Reduce, eliminate, or reverse subsidence adjacent to affected levees.	L010401	Implement current best management practices (BMPs) to correct subsidence effects on levees.
			L010402	Fund grant projects to develop BMPs that address levee subsidence.
Water Quality Program				
Q1. Reduction of oxygen-depleting substances in the aquatic environment.	Sacramento–San Joaquin Delta	Eliminate occurrences of dissolved oxygen concentrations below 5 milligrams per liter (mg/l) throughout the water column; reduce the impairment or blockage of fish migration past Stockton; reduce occurrence of algal blooms; reduce stress to fish resulting from low dissolved oxygen concentration near Stockton; and eliminate fish kills near Stockton. Performance of all these measures can be determined by appropriate monitoring programs.	Q010101	Require continued reduction of oxygen depleting substances from the Regional Water Control Facility (RWCF), the Port of Stockton and other National Pollutant Discharge Elimination System (NPDES) and Waste Discharge Requirement permittees in order to improve water quality during chinook salmon migration.
			Q010102	Provide technical and financial assistance and regulatory incentives for implementing BMPs to control oxygen depletion.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q1. Reduction of oxygen-depleting substances in the aquatic environment.	Sacramento–San Joaquin Delta	Have dissolved oxygen concentrations above the 5 mg/l standard, biological oxygen demand (BOD) concentrations below 30 mg/l, and natural ecosystem processes and functions restored in the creeks.	Q010103	Possible management actions include physical mixing or other methods to decrease stratification and increase aeration in the Ship Channel and Turning Basin during periods of low dissolved oxygen, changing effluent discharge location, changing the channel.
		Have dissolved oxygen concentrations above the 5 mg/l standard, BOD concentrations below 30 mg/l, and natural ecosystem processes and functions restored in the creeks.	Q010104	There should be further effort to enforce the waste discharge restrictions of permitted and unpermitted dischargers.
Q2. Maintain pathogen loadings or below maximum allowed levels and reduce levels of total organic carbon (TOC), bromide, and total dissolved solids (TDS) to increase the availability of water for beneficial uses.	Sacramento–San Joaquin Delta	Decrease levels of nutrients, pathogens, nonseawater TDS, and TOC in drinking water supplies.	Q010201	Manage restoration projects to minimize adverse impacts and maximize benefits for drinking water quality.
			Q010202	Minimize pathogens from recreational boating.
			Q010203	Develop and implement watershed management programs for Clifton Court and Bethany Reservoir to address nutrients and pathogens.
			Q010204	Control wastewater discharges from Discovery Bay outfall.
			Q010205	Relocation, reduction, or elimination of agricultural drainage into Rock Slough.
			Q010206	Relocate the Tracy intake to avoid wastewater treatment plant effluent.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q4. Reduction of pesticide loadings in the aquatic environment.	Sacramento–San Joaquin Delta	Reduce concentrations of pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q010501	<p>Support conservation efforts to help achieve the Water Quality Program objectives. Develop and implement BMPs. On-farm conservation practices could include installation or implementation of the following features:</p> <ul style="list-style-type: none"> • tailwater ditch tarps, • land leveling, cutback stream, • surge irrigation, • sprinkler germination, • drip irrigation, • shorten length of run, • gated surface pipe, • vegetated filter strip, • cover crop, • grassed waterway, conservation tillage, • sediment basin, • tailwater return system, • irrigation management, • nutrient management, • integrated pest management, and • tailwater management.
Q7. Reduction of cadmium, copper, and zinc loadings to levels that do not adversely effect Bay-Delta species or beneficial uses of water.	Sacramento–San Joaquin Delta	Reduce metal loading of the Bay–Delta and its tributaries to levels that do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q010801	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Water Use Efficiency Program				
W1. Support implementation of water management techniques that increase the effectiveness of water use management and efficiency for agricultural uses.	Sacramento–San Joaquin Delta	Support implementation of water management techniques that increase the effectiveness of water use management and efficiency for agricultural uses.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
W2. Support implementation of measures that increase agricultural production per unit of water used, protect water quality, or increase environmental benefits while meeting agricultural needs.	Sacramento–San Joaquin Delta	Support implementation of measures that increase agricultural production per unit of water used, protect water quality, or increase environmental benefits while meeting agricultural needs.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
W3. Provide urban water agencies with planning and technical assistance, financing assistance, and assurances for development and implementation of water management plans and BMPs.	Sacramento–San Joaquin Delta	Provide urban water agencies with planning and technical assistance, financing assistance, and assurances for development and implementation of water management plans and BMPs.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
W4. Support development and implementation of water recycling projects.	Sacramento–San Joaquin Delta	Support development and implementation of water recycling projects.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
Water Transfer Program				
T1. Implement a framework of actions, policies, and processes that will facilitate transfers and the further development of a statewide water transfer market.	Sacramento–San Joaquin Delta	Implement a framework of actions, policies, and processes that will facilitate transfers and the further development of a statewide water transfer market.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
Watershed Management Program				
M1. Fund and implement watershed restoration, maintenance, conservation, and monitoring activities.	Sacramento–San Joaquin Delta	Fund and implement watershed restoration, maintenance, conservation, and monitoring activities.	None.	Specific program actions have not yet been identified. The focus of the program is primarily in the upper watersheds of the Bay-Delta and, therefore, outside of the geographic scope of the MSCS. The potential impacts of implementing the program have been analyzed in the Programmatic EIS/EIR.
Conveyance Program				
C1. Construct and operate modifications to existing south Delta conveyance features.	Sacramento–San Joaquin Delta	Construct and operate modifications to existing south Delta conveyance features.	C010101	Extend operation of the Temporary Barriers Program.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
C1. Construct and operate modifications to existing south Delta conveyance features.	Sacramento–San Joaquin Delta	Construct and operate modifications to existing south Delta conveyance features.	C010102	Modify SWP operating rules to all export pumping up to the current physical capacity of SWP export facilities (approximately 8,500 cfs) within the constraints of the 1995 Water Quality Control Plan.
			C010103	Construct a new screened intake at Clifton Court Forebay that allows diversion of up to 10,300 cfs throughout the tidal cycle. This would include new fish salvage facilities and other ancillary facilities.
			C010104	Construct either a new screened intake at the head of the channel leading to the CVP pumping plant at Tracy or expand the proposed new diversion at Clifton Court Forebay with a new intertie to the Tracy Pumping Plant. These facilities would be screened and sized to meet the full export capacity of the Tracy pumps (4,600 cfs).
			C010105	Construct an intertie to allow up to 400 cfs of pumping from the CVP Delta Mendota Canal to the SWP California Aqueduct.
			C010106	Construct an intertie connecting the Tracy Pumping Plant to Clifton Court Forebay.
			C010107	Construct an operable barrier at the head of Old River to improve salmon survival.
			C010108	Construct up to 3 additional operable barriers in the South Delta and implement limited dredging to address problems that may be associated with export operations.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
C2. Construct and operate modifications to existing north Delta conveyance features.	Sacramento–San Joaquin Delta	Construct and operate modifications to existing north Delta conveyance features.	C020101	Develop operational criteria for the DCC that balance flood control, water quality, water supply reliability, and fisheries concerns.
			C020102	Evaluate whether a 4,000-cfs screened diversion from the Sacramento River to the Mokelumne River to improve or maintain central Delta water quality is feasible.
			C020103	Evaluate the feasibility of implementing setback levees and/or channel dredging along the Mokelumne River from Interstate 5 downstream to the San Joaquin River to improve conveyance and flood control.
C3. Construct and operate an isolated conveyance facility from the Sacramento River along the eastern side of the Delta to Clifton Court Forebay.	Sacramento–San Joaquin Delta	Construct and operate an isolated conveyance facility from the Sacramento River along the eastern side of the Delta to Clifton Court Forebay.	C030101	Evaluate the need and feasibility for an isolated conveyance facility from the Sacramento River to the SWP and CVP export facilities in the South Delta. Capacities would range from 5,000 to 15,000 cfs.
Storage Facilities Program				
S1. Construct and operate enlarged or new surface storage facilities.	Sacramento–San Joaquin Delta	Construct and operate enlarged or new surface storage facilities.	None.	Construct an in-Delta surface water storage facility.

Table B-1. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Conveyance and Storage Operations				
01. Implement operating criteria needed to improve water management for beneficial uses.	Sacramento–San Joaquin Delta	Implement operating criteria needed to improve water management for beneficial uses.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
02. Implement a Water Management Strategy to provide operational flexibility to achieve environmental benefits.	Sacramento–San Joaquin Delta	Implement a Water Management Strategy to provide operational flexibility to achieve environmental benefits.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.

Acronyms:

AFRP	Anadromous Fish Restoration Program	MSCS	Multi-Species Conservation Strategy
BMP	best management practice	NPDES	National Pollutant Discharge Elimination System
BOD	biological oxygen demand	PG&E	Pacific Gas and Electric Company
cfs	cubic feet per second	PL	Public Law
CVP	Central Valley Project	RWCF	Regional Water Control Facility
DCC	Delta Cross Channel	SRA	shaded riverine aquatic
DFG	California Department of Fish and Game	SWP	State Water Project
EBMUD	East Bay Municipal Utility District	TDS	total dissolved solids
ERP	Ecosystem Restoration Program	TOC	total organic carbon
mg/l	milligrams per liter	USFWS	U.S. Fish and Wildlife Service

Citations:

U.S. Fish and Wildlife Service. 1995. Formal consultation and conference on the effects of long-term operation of the Central Valley Project and State Water Project on the threatened delta smelt, delta smelt critical habitat, and proposed threatened Sacramento splittail.

_____. 1997. Revised draft anadromous fish restoration plan: a plan to increase natural production of anadromous fish in the Central Valley of California. May 30, 1997.

Table B-2. Bay Region: Proposed CALFED Actions Evaluated in the Multi-Species Conservation Strategy

Multi-Species Conservation Strategy (MSCS) User Guide: This table presents a summary of the Preferred Alternative and Common Program targets and actions identified in the Programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the Bay Region that are evaluated and covered under the MSCS. A description of the types of CALFED targets and actions not covered under the MSCS is presented in Chapter 4, Section 4.1.1. As described in Chapter 4, Section 4.1.1, the MSCS analyzes the Summary Programmatic Action Outcomes (summary outcomes), which embody all of the targets and actions listed for each summary outcome (shown in the third and fifth table columns, respectively). Table 4-1 summarizes the summary outcomes analyzed in the MSCS by CALFED region. Each summary outcome is assigned a unique code (e.g., E1). The second column identifies the Ecosystem Restoration Program (ERP) ecological management zone in which targets and actions could be implemented. A unique action code has been assigned to each action and is shown in the fourth column.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Ecosystem Restoration Program				
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Suisun Marsh/North San Francisco Bay	More closely emulate the natural pattern of seasonal freshwater inflow to North San Francisco Bay to transport sediments; allow upstream and downstream fish passage; contribute to riparian vegetation succession; permit transport of larval fish to the entrainment zone; maintain the entrainment zone in Suisun Bay; and provide adequate attraction flows for upstream, through-Bay migrating salmon. Delta outflow in dry and normal years will be improved by coordinating releases and natural flows in the Sacramento River Basin to provide a March flow event of at least 20,000 cubic feet per second (cfs) for 10 days in dry years, at least 30,000 cfs for 10 days in below-normal years, and at least 40,000 cfs for 10 days in above-normal years. The existing smaller, late-April and early-May flow event will be improved with additional releases of water from San Joaquin River and Delta tributaries to provide flows of magnitudes and durations similar to those prescribed for March.	E020101	Develop a cooperative program to provide target flows in dry and normal years by allowing inflows to major storage reservoirs prescribed in the visions of upstream ecological zones to pass downstream into and through the Delta. (This action would result from an accumulation of recommendations for spring flow events and minimum flows from upstream ecological zones.)

Table B-2. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E5b. Restoration of at least 1,500 acres of tidal shallow-water habitat.	Suisun Marsh/North San Francisco Bay	Expand the floodplain area in the Napa River, Sonoma Creek, and Petaluma River ecological management units by putting approximately 10% of levied lands into the active floodplain.	E020401	Convert levied lands to tidal wetland/slough complexes.
		Restore 1,500 acres of shallow-water habitat in the Suisun Bay and Marsh Ecological Unit.	E020901	Develop a cooperative program to acquire and restore 1,500 acres of shallow-water habitat in the Suisun Bay and Marsh Ecological Unit.
		Restore slough habitat for fish and associated wildlife species. Restore 5 miles of slough habitat in the near term, and 10 miles in the long term, in the Suisun Bay and Marsh Ecological Unit. Restore 10 miles of slough habitat in the near term, and 20 miles in the long term, in the Napa River, Sonoma Creek, and Petaluma River Ecological Units.	E021101	In association with wetland/marsh restoration efforts, construct sloughs in marsh/slough complexes by acquiring land and purchasing easements.
		Manage existing and restored dead-end and open-end sloughs and channels within the ecological zone so that less than 1% of the surface area of these sloughs and channels is covered by invasive non-native aquatic plants.	E025201	Conduct large-scale, annual weed eradication programs throughout existing and restored dead-end and open-end sloughs and channels in each ecological unit so that less than 1% of the surface area of these sloughs and channels is covered by invasive non-native aquatic plants within 10 years.
E7. Protection of 6,200 existing acres and restoration of 7,500–12,000 additional acres of tidal saline emergent wetland.	Suisun Marsh/North San Francisco Bay	Expand the floodplain area in the Napa River, Sonoma Creek, and Petaluma River by putting approximately 10% of levied lands into the active floodplain.	E020401	Convert levied lands to tidal wetland/slough complexes.

Table B-2. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E7. Protection of 6,200 existing acres and restoration of 7,500–12,000 additional acres of tidal saline emergent wetland.	Suisun Marsh/North San Francisco Bay	Restore 1,500 acres of shallow-water habitat in the Suisun Bay and Marsh Ecological Unit.	E020901	Develop a cooperative program to acquire and restore 1,500 acres of shallow-water habitat in the Suisun Bay and Marsh Ecological Unit.
		Restore slough habitat for fish and associated wildlife species. Restore 5 miles of slough habitat in the near term, and 10 miles in the long term, in the Suisun Bay and Marsh Ecological Unit. Restore 10 miles of slough habitat in the near term, and 20 miles in the long term, in the Napa River, Sonoma Creek, and Petaluma River Ecological Units.	E021101	In association with wetland/marsh restoration efforts, construct sloughs in marsh/slough complexes by acquiring land and purchasing easements.
		Restore tidal action to 5,000–7,000 acres in the Suisun Bay and Marsh Ecological Unit; 1,000–2,000 acres in the Napa River Ecological Unit; and 500–1,000 acres each in the Sonoma Creek, Petaluma River, and San Pablo Bay Ecological Units.	E027301	Develop a cooperative program to acquire, in fee-title or through a conservation easement, the land needed for tidal restoration, and complete the needed steps to restore the wetlands to tidal action.
		Protect 6,200 acres of existing saline emergent wetlands in the Suisun Bay and Marsh Ecological Management Unit.	E027302	Develop a cooperative program to acquire, in fee-title or through a conservation easement, existing wetlands subject to tidal action.
		Restore full tidal action to muted marsh areas along the north shore of the Contra Costa shoreline.	E027303	Develop a cooperative program to evaluate, acquire (in fee-title or through a conservation easement), and restore existing muted wetlands subject to tidal action.

Table B-2. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E7. Protection of 6,200 existing acres and restoration of 7,500–12,000 additional acres of tidal saline emergent wetland.	Suisun Marsh/North San Francisco Bay	Increase the population of breeding pairs of Suisun song sparrow between 70% and 100% compared to existing population estimates of 6,000.	E023904	Establish additional and protect existing dispersal corridors of suitable tidal brackish marsh along the banks of tidal sloughs.
			E023903	Maintenance activities should be conducted to minimize disturbance to tidal brackish marsh vegetation and should not disturb breeding adults.
E13b. Restoration of 1,000–1,500 acres of seasonal wetland and enhancement and management of up to 58,000 acres of existing seasonal wetlands for wildlife.	Suisun Marsh/North San Francisco Bay	Assist in protecting and enhancing 40,000–50,000 acres of existing degraded seasonal wetland habitat in the Suisun Bay and Marsh Ecological Unit per the objectives of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E023904	Restore tidal habitat as specified for tidal saline emergent wetland in appropriate areas with particular emphasis on expanding existing fragments of habitat to expand the number of known nesting territories in the Suisun Marsh by 200%.
		Increase the existing population of salt marsh harvest mouse by 100%.	E027401	Restore high tidal marsh habitats in proximity to upland habitats consistent with the recovery plan for this species.
		Identify the remaining populations of Suisun ornate shrew and develop a conservation plan to stop the decline of this species.	E027501	Identify all remaining populations of Suisun ornate shrew and develop and implement protection/restoration plans.
E7. Protection of 6,200 existing acres and restoration of 7,500–12,000 additional acres of tidal saline emergent wetland.	Suisun Marsh/North San Francisco Bay	Determine the distribution and taxonomic status of the San Pablo California vole while maintaining existing salt marsh habitat known to support populations.	E027601	Undertake wetland restoration projects in and adjacent to known populations to increase available habitat.

Table B-2. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E7. Protection of 6,200 existing acres and restoration of 7,500–12,000 additional acres of tidal saline emergent wetland.	Suisun Marsh/North San Francisco Bay	Manage existing and restored dead-end and open-end sloughs and channels within the ecological zone so that less than 1% of the surface area of these sloughs and channels is covered by invasive non-native aquatic plants.	E025201	Conduct large-scale, annual weed eradication programs throughout existing and restored dead-end and open-end sloughs and channels in each ecological unit so that less than 1% of the surface area of these sloughs and channels is covered by invasive non-native aquatic plants within 10 years.
E10b. Restoration of 35–70 miles (213–423 acres) of tidal sloughs.	Suisun Marsh/North San Francisco Bay	Restore slough habitat for fish and associated wildlife species. Restore 5 miles of slough habitat in the near term, and 10 miles in the long term, in the Suisun Bay and Marsh Ecological Unit. Restore 10 miles of slough habitat in the near term, and 20 miles in the long term, in the Napa River, Sonoma Creek, and Petaluma River Ecological Units.	E021101	In association with wetland/marsh restoration efforts, construct sloughs in marsh/slough complexes by acquiring land and purchasing easements.
E12. Restoration of up to 1,600 acres of nontidal deep open-water habitat adjacent to existing and restored wetlands.	Suisun Marsh/North San Francisco Bay	Develop 1,600 acres of deeper (3–6 feet deep) open-water areas to provide resting habitat for water birds, and foraging habitat for diving ducks and other water birds that feed in deep water.	E021001	Develop a cooperative program to acquire and develop 400 acres of deeper open-water areas adjacent to restored saline emergent wetland habitats in the Suisun Bay and Marsh Ecological Management Unit.
			E021002	Develop a cooperative program to acquire and develop 400 acres of deeper open-water areas adjacent to restored saline emergent wetland habitats in each of the Napa River, Sonoma Creek, and Petaluma River Ecological Units (1,200 acres total).

Table B-2. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E13b. Restoration of 1,000–1,500 acres of seasonal wetland and enhancement and management of up to 58,000 acres of existing seasonal wetlands for wildlife.	Suisun Marsh/North San Francisco Bay	Assist in protecting and enhancing 40,000–50,000 acres of existing degraded seasonal wetland habitat in the Suisun Bay and Marsh Ecological Unit per the objectives of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E021501	Support the cooperative program to improve management of 26,000 acres of degraded seasonal wetland habitat in the Suisun Bay and Marsh Ecological Unit.
E7. Protection of 6,200 existing acres and restoration of 7,500–12,000 additional acres of tidal saline emergent wetland.	Suisun Marsh/North San Francisco Bay	Assist in protecting and enhancing 40,000–50,000 acres of existing degraded seasonal wetland habitat in the Suisun Bay and Marsh Ecological Unit per the objectives of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E021502	Support the development of a cooperative program to improve management of 32,000 acres of existing seasonal wetland habitat in the Suisun Bay and Marsh Ecological Unit.
		Acquire and convert 1,000–1,500 acres of existing farmed baylands in the Suisun Marsh to seasonal wetlands.	E021503	Develop a cooperative program to acquire, in fee-title or through a conservation easement, existing farmed baylands and restore tidal action.
E14a. Protection and enhancement of up to 100 acres of vernal pools and 500–1,000 acres of surrounding lands.	Suisun Marsh/North San Francisco Bay	Protect and manage vernal pools in the Suisun Bay and Marsh Ecological Unit that provide suitable habitat for listed fairy shrimp species, the Delta green ground beetle, and special-status plant species to assist in these species' recovery. Where feasible, restore vernal pools that have been degraded by agricultural activities to provide suitable habitat for special-status invertebrates and plants and amphibians, such as the spadefoot toad, to assist in the recovery of these populations.	E021504	Develop a cooperative program to acquire 100 acres of vernal pools and 500–1,000 acres of adjacent buffer areas to restore a corridor the size of the Jepson Prairie Preserve in the Yolo Basin Ecological Unit.

Table B-2. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E14a. Protection and enhancement of up to 100 acres of vernal pools and 500–1,000 acres of surrounding lands.	Suisun Marsh/North San Francisco Bay	Expand the existing population of the delta green ground beetle and establish additional populations to remove it from the federal threatened species list.	E026201	Increase populations of delta green ground beetle by establishing and securing habitat to support three additional viable and self-sustaining colonies of the delta green ground beetle and maintain the existing populations.
E15b. Restoration of 200–300 acres of riparian habitat along up to 75 miles of channels and reduction of populations of invasive non-native riparian plants by 50%.	Suisun Marsh/North San Francisco Bay	Restore 10–15 linear miles of riparian habitat along corridors of riparian scrub and shrub vegetation in each of the ecological units, of which 60% is more than 15 yards wide and 25% is no less than 5 yards wide and 1 mile long.	E021601	Coordinate with landowners and managers to restore and maintain 10–15 linear miles of riparian habitat along corridors of riparian scrub and shrub vegetation in each of the ecological units, of which 60% is more than 15 yards wide and 25% is no less than 5 yards wide and 1 mile long.
		Reduce by 50% the area covered by invasive non-native woody species, such as giant reed and eucalyptus, that compete with native riparian vegetation, and eradicate invasive woody plants from restoration areas.	E025301	Develop a cooperative program to remove and suppress invasive non-native plants that compete with native riparian vegetation by reducing the area occupied by these species (such as giant reed and eucalyptus) by 50%.
			E025302	Develop a cooperative program to eliminate invasive woody plants from restoration sites to protect native riparian vegetation.
E16b. Restoration of up to 5,000 acres of perennial grassland.	Suisun Marsh/North San Francisco Bay	Restore 1,000 acres of perennial grassland in each of the ecological units associated with existing or proposed wetlands.	E021801	Develop a cooperative program to restore perennial grasslands by acquiring conservation easements or purchasing land from willing sellers.
E21. Reduction in the probability of introduction and establishment of non-native aquatic species into the Bay-Delta.	Suisun Marsh/North San Francisco Bay	Reduce or eliminate the influx of non-native aquatic species in ship ballast water.	E025401	Fund additional inspection staff to enforce existing regulations.

Table B-2. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E21. Reduction in the probability of introduction and establishment of non-native aquatic species into the Bay-Delta.	Suisun Marsh/North San Francisco Bay	Reduce the potential for influx of non-native aquatic plant and animal species at border crossings.	E025402	Provide funding to the California Department of Food and Agriculture to expand or establish, as appropriate, a comprehensive program to exclude, detect, and manage invasive aquatic species, such as zebra mussel.
E22. Reduction in the adverse effects of diversions on fish.	Suisun Marsh/North San Francisco Bay	Reduce entrainment losses of juvenile fish at diversions by 25%–50% by installing positive-barrier fish screens on large diversion structures.	E024701	Develop a cooperative program to consolidate, screen, or eliminate diversions in the Suisun Marsh/North San Francisco Bay Ecological Zone.
E24. Reduction in levels of predation on juvenile anadromous fish.	Suisun Marsh/North San Francisco Bay	Limit supplementation of striped bass to life stages that minimize the rate of predation on juvenile anadromous and estuarine fish.	E025601	Provide sufficient equipment, support staff, and operation and maintenance funds to hold juvenile striped bass longer so they can be planted at 2 years old instead of 1 year old.
E25. Reduction in the adverse effects of harvest on fish and wildlife populations.	Suisun Marsh/North San Francisco Bay	Reduce illegal harvest of anadromous fish and waterfowl in Suisun Marsh and San Francisco Bay by increasing enforcement.	E025801	Provide additional funding to California Department of Fish and Game (DFG) for additional enforcement.
			E025802	Provide additional funding to county sheriff's departments and state and local park agencies to support additional enforcement efforts.
			E025803	Provide rewards for the arrest and conviction of poachers.
E28. Reduction in the adverse effects of boat wakes on shoreline habitats and wildlife in sensitive habitat areas.	Suisun Marsh/North San Francisco Bay	Reduce boat wakes near California clapper and black rail nesting areas in Suisun Marsh and San Francisco Bay from March to June to prevent destruction of nests to assist in the recovery of this listed species.	E026001	Develop a cooperative program with local agencies to establish and enforce zones prohibiting boat wakes within 50 yards of California black rail nesting areas in Suisun Marsh and San Francisco Bay from March to June.

Table B-2. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E28. Reduction in the adverse effects of boat wakes on shoreline habitats and wildlife in sensitive habitat areas.	Suisun Marsh/North San Francisco Bay	Reduce boat wakes near California clapper and black rail nesting areas in Suisun Marsh and San Francisco Bay from March to June to prevent destruction of nests to assist in the recovery of this listed species.	E026002	Develop a cooperative program with local agencies to establish and enforce zones prohibiting motorized boats in 5 miles of dead-end channels in Suisun Marsh and San Francisco Bay from March to June.
			E026003	Develop a cooperative program with local agencies to establish and enforce zones prohibiting motorized boats in new, small channels in restored tidal wetlands.
E30. Enhancement of habitat conditions for the Suisun song sparrow in occupied habitat areas.	Suisun Marsh/North San Francisco Bay	Increase the population of breeding pairs of Suisun song sparrow between 70% and 100% compared to existing population estimates of 6,000.	E023901	Encourage the growth of upland vegetation on the upper banks of levees to provide upland cover to protect against predation during high tides and high flows.
			E023902	Establish additional and protect existing dispersal corridors of suitable tidal brackish marsh along the banks of tidal sloughs.
			E023903	Maintenance activities should be conducted to minimize disturbance to tidal brackish marsh vegetation and should not disturb breeding adults.
			E023904	Restore tidal habitat as specified for tidal saline emergent wetland in appropriate areas with particular emphasis on expanding existing fragments of habitat to expand the number of known nesting territories in the Suisun Marsh by 200%.

Table B-2. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Levee System Integrity Program				
L3. Improvement and maintenance of Suisun Marsh levees.	Suisun Marsh/North San Francisco Bay	None.	None.	None.
Water Quality Program				
Q2. Maintain pathogen loadings or below maximum allowed levels and reduce levels of total organic carbon, bromide, and total dissolved solids to increase the availability of water for beneficial uses.	Suisun Marsh/North San Francisco Bay	Decrease levels of nutrients, pathogens, nonseawater total dissolved solids (TDS), and total organic carbon (TOC) in drinking water supplies.	Q020201	Manage restoration projects to minimize adverse impacts and maximize benefits for drinking water quality.
			Q020202	Minimize pathogens from recreational boating.
			Q020203	Implement Barker Slough Watershed Management Program.
			Q020204	Relocation of the North Bay Aqueduct intake.

Table B-2. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q4. Reduction of pesticide loadings in the aquatic environment.	Suisun Marsh/North San Francisco Bay	Reduce concentrations of pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q020501	<p>Support conservation efforts to help achieve the Water Quality Program objectives. Develop and implement best management practices (BMPs). On-farm conservation practices could include installation or implementation of the following features:</p> <ul style="list-style-type: none"> • tailwater ditch tarps, • land leveling, • cutback stream, • surge irrigation, • sprinkler germination, • drip irrigation, • shortened length of run, • gated surface pipe, • vegetated filter strip, • covered crop, • grassed waterway, conservation tillage, • sediment basin, • tailwater return system, • irrigation management, • nutrient management, • integrated pest management, and • tailwater management.
Q7. Reduction of cadmium, copper, and zinc loadings to levels that do not adversely effect Bay-Delta species or beneficial uses of water.	Suisun Marsh/North San Francisco Bay	Reduce metal loading of the Bay-Delta and its tributaries to levels that do not adversely effect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q020801	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.

Table B-2. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q8. Reduction of sediment loadings to levels which do not adversely effect beneficial uses of surface water.	Suisun Marsh/North San Francisco Bay	Reduce sediment in areas to the degree that sediment does not cause negative impacts to beneficial uses of the surface water, including ecosystem benefits and municipal uses.	Q020901	Implement erosion control BMPs on urban construction and BMPs for agricultural lands to reduce sediment in the Napa River.
Water Use Efficiency Program				
W1. Support implementation of water management techniques that increase the effectiveness of water use management and efficiency for agricultural uses.	Suisun Marsh/North San Francisco Bay	Support implementation of water management techniques that increase the effectiveness of water use management and efficiency for agricultural uses.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
W2. Support implementation of measures that increase agricultural production per unit of water used, protect water quality, or increase environmental benefits while meeting agricultural needs.	Suisun Marsh/North San Francisco Bay	Support implementation of measures that increase agricultural production per unit of water used, protect water quality, or increase environmental benefits while meeting agricultural needs.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
W3. Provide urban water agencies with planning and technical assistance, financing assistance, and assurances for development and implementation of water management plans and BMPs.	Suisun Marsh/North San Francisco Bay	Provide urban water agencies with planning and technical assistance, financing assistance, and assurances for development and implementation of water management plans and BMPs.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
W4. Support development and implementation of water recycling projects.	Suisun Marsh/North San Francisco Bay	Support development and implementation of water recycling projects.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.

Table B-2. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Water Transfer Program				
T1. Implement a framework of actions, policies, and processes that will facilitate transfers and the further development of a statewide water transfer market.	Suisun Marsh/North San Francisco Bay	Implement a framework of actions, policies, and processes that will facilitate transfers and the further development of a statewide water transfer market.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
Watershed Management Program				
M1. Fund and implement watershed restoration, maintenance, conservation, and monitoring activities.	Suisun Marsh/North San Francisco Bay	Fund and implement watershed restoration, maintenance, conservation, and monitoring activities.	None.	Specific program actions have not yet been identified. The focus of the program is primarily in the upper watersheds of the Bay-Delta and, therefore, outside of the geographic scope of the MSCS. The potential impacts of implementing the program have been analyzed in the Programmatic EIS/EIR.

Acronyms:

BMP	best management practice
cfs	cubic feet per second
DFG	California Department of Fish and Game
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
ERP	Ecosystem Restoration Program
MSCS	Multi-Species Conservation Strategy
TDS	total dissolved solids
TOC	total organic carbon

Table B-3. Sacramento River Region: Proposed CALFED Actions Evaluated in the Multi-Species Conservation Strategy

Multi-Species Conservation Strategy (MSCS) User Guide: This table presents a summary of the Preferred Alternative and Common Program targets and actions identified in the Programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the Sacramento River Region that are evaluated and covered under the MSCS. A description of the types of CALFED targets and actions not covered under the MSCS is presented in Chapter 4, Section 4.1.1. As described in Chapter 4, Section 4.1.1, the MSCS analyzes the Summary Programmatic Action Outcomes (summary outcomes), which embody all of the targets and actions listed for each summary outcome (shown in the third and fifth table columns, respectively). Table 4-1 summarizes the summary outcomes analyzed in the MSCS by CALFED region. Each summary outcome is assigned a unique code (e.g., E1). The second column identifies the Ecosystem Restoration Program (ERP) ecological management zone in which targets and actions could be implemented. A unique action code has been assigned to each action and is shown in the fourth column.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Ecosystem Restoration Program				
E1. Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Sacramento River	More closely emulate the seasonal streamflow patterns in dry and normal year types by allowing a late-winter or early-spring flow event of approximately 8,000–10,000 cubic feet per second (cfs) in dry years and 15,000–20,000 cfs in below normal water years to occur below Keswick Dam.	E030101	Provide a flow event by supplementing normal operating flows from Shasta and Keswick Dams with releases from Lake Shasta and Trinity Lake in March during years when no flow event has occurred during winter or is expected to occur. Flow events would be provided only when sufficient inflow to Lake Shasta is available to sustain the prescribed releases. This action can be refined by evaluating its indirect costs and the overall effectiveness of achieving objectives.
		Maintain base flows of 6,000–8,000 cfs during fall.	E030102	Provide flow releases from Shasta Lake and Keswick Dam when necessary to provide the target base flows. Releases would be made only when inflows equal or exceed prescribed releases.
	North Sacramento Valley	Increase flow in Cow Creek by 25–50 cfs, corresponding to the natural seasonal runoff pattern, and maintain 25–75 cfs during October.	E040101	Increase flow in Cow Creek by purchasing water from willing sellers or implementing a conjunctive groundwater program.
		Increase flow in Clear Creek to 150–200 cfs from October 1 to May 31, and to 100–150 cfs from June 1 to September 30.	E040102	Develop a cooperative program to improve flow in Clear Creek by increasing releases from Clair Hill and Whiskeytown Dams.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	North Sacramento Valley	Augment flow in Battle Creek by 25–50 cfs.	E040103	Increase flow in Battle Creek by purchasing water from willing sellers or providing compensation for forgone power production. This includes negotiating and renewing an existing interim flow agreement between the Department of the Interior and Pacific Gas & Electric Company (PG&E), and includes a provision for the release of 10 cfs at the Asbury Pump on Baldwin Creek, a dewatered Battle Creek tributary that provides steelhead habitat. In the longer term, this action also includes increasing flows at the Inskip Diversion Dam and South Diversion Dam.
		Augment flow in Bear Creek by 10–20 cfs.	E040104	Increase Bear Creek flow by purchasing water from willing sellers or providing alternative sources of water to diverters during important fish-passage periods in spring and fall.
		Reduce or eliminate conflicts between the diversion of water and chinook salmon and steelhead populations at all diversion sites on Battle Creek.	E044701	Develop a cooperative approach to improve conditions for anadromous fish in Battle Creek by installing fish screens at four diversions on the North Fork, three diversions on the South Fork, and one diversion on the mainstem, or acquire water rights to eliminate the need for diversion and screening.
	Cottonwood Creek	Reduce or eliminate conflicts between the diversion of water and chinook salmon and steelhead populations at all diversions on Clear Creek.	E044703	Acquire water rights on Clear Creek at the McCormick-Saeltzer Dam to eliminate the need for diversion.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Cottonwood Creek	During summer and fall, more closely emulate the seasonal streamflow pattern, so that flows are sufficient for chinook salmon holding and spawning in most year types of providing up to 20–50 cfs. These flows can mobilize and transport sediments, allow upstream and downstream fish passage, create point bars, and contribute to stream channel meander and riparian vegetation succession.	E050101	Augment summer and fall flows in Cottonwood Creek by purchasing water from willing sellers and developing alternative supplies.
	Butte Basin	Increase spring and fall flow in Paynes Creek.	E070101	Develop a cooperative approach to increase flow in Paynes Creek by acquiring water from willing sellers or by developing alternative supplies.
		Increase flow in Antelope Creek from October 1 through June 30.	E070102	Develop a cooperative approach to increase flow in Antelope Creek by acquiring water from willing sellers, or by providing alternative water supplies to diverters during the upstream and downstream migration of adult and juvenile spring- and fall-run chinook salmon and steelhead trout.
		Increase flow in Mill Creek.	E070103	Develop a cooperative approach to increase flow in the lower 8 miles of Mill Creek by acquiring water from willing sellers, or by providing alternative water supplies to diverters during the upstream migration of adult salmon and steelhead.
		Increase flow in the lower 10 miles of Deer Creek.	E070104	Develop a cooperative approach to increase flow in the lower section of Deer Creek by acquiring water from willing sellers, or by providing alternative supplies during the upstream migration of adult spring- and fall-run chinook salmon and steelhead trout.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Butte Basin	Increase flow in Butte Creek.	E070105	Develop a cooperative approach to increase flow in Butte Creek by acquiring water from willing sellers.
		Maintain a minimum year-round flow of 40 cfs in Butte Creek between the Centerville Diversion Dam and the Centerville Powerhouse.	E070106	Develop a cooperative program with PG&E to maintain a minimum flow in Butte Creek below the Centerville Diversion Dam.
	Feather River/Sutter Basin	<p>More closely emulate the seasonal streamflow pattern in the Feather River by:</p> <ul style="list-style-type: none"> • providing March flow events of: <ul style="list-style-type: none"> – 4,000–6,000 cfs in dry years, – 6,000–8,000 cfs in below-normal years, and – 8,000–10,000 cfs in above-normal years; and • providing or maintaining flows that mobilize and transport sediments, allow upstream and downstream fish passage, create point bars, and contribute to stream channel meander and riparian vegetation succession. • In addition, provide minimum flows recommended by the California Department of Fish and Game (DFG) (California Department of Fish and Game 1993). Flows will be provided only if they are less than or equal to the level of Oroville Reservoir inflow. 	E080101	Develop a cooperative program to evaluate the benefits of supplemental Feather River flows to ecological processes and riparian and riverine aquatic habitats.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Feather River/Sutter Basin	Evaluate the potential benefits to increased salmon and steelhead production in the Feather River of the release from Oroville Dam of: <ul style="list-style-type: none"> • 2,500 cfs from September through May and 1,100 cfs from June through August in wet and normal years, and • 1,700 cfs from September through May and 800 cfs from June through August in dry years. 	E080102	Develop a cooperative program to supplement flows in the Feather River with water acquired from new water supplies, water transfers, and willing sellers in accordance with applicable guidelines or negotiated agreements.
		Supplement flows in the Yuba River with March flow events of 2,000–3,000 cfs in dry years and 3,000–4,000 cfs in normal years to improve conditions for all chinook salmon, steelhead, and American shad life stages. In addition, provide minimum flows recommended at Marysville by DFG (California Department of Fish and Game 1993). Flows will be provided only if inflow to Englebright and New Bullards Bar Reservoirs is sufficient to meet the flows. Minimum streamflow recommendations for Yuba River at Marysville (period and flow in all water year types) are: <ul style="list-style-type: none"> • October 1–March 31: 600–700 cfs; • April 1–June 30: 1,000 cfs minimum; and • July 1–September 30: 450 cfs. 	E080103	Supplement flows in the Yuba River below Englebright Dam with water acquired from new water supplies, water transfers, and willing sellers consistent with applicable guidelines, or negotiate agreements to improve conditions for all life stages of chinook salmon and steelhead to provide flows recommended by DFG (California Department of Fish and Game 1993).
		Supplement flows in the Bear River to improve conditions for all life stages of chinook salmon and steelhead. Provide a flow event of 300–500 cfs in dry years. Minimum streamflow recommendations for the Bear River: (Month: Flows [cfs]): October 1–14: 100, October 15–December 15: 250, January–March: 250, April–June: 250, July–September: 10.	E080104	Supplement flows in the Bear River with water acquired from new water supplies, water transfers, and willing sellers consistent with applicable guidelines, or negotiate agreements to improve conditions for all chinook salmon and steelhead life stages.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	American River Basin	Develop and implement an ecologically based streamflow regulation plan for the American River Basin creeks and the lower American River. The lower American River should meet the recommended flows and flow targets for the lower American River. Lower American River flow events should be coordinated with similar flows that occur naturally in the Sacramento Valley and with storage releases from Shasta and Oroville Reservoirs. Average monthly minimum flow targets (cfs) are:	E090101	Provide target flows by modifying Central Valley Project (CVP) operations and acquiring water as needed from willing sellers, with consideration given to available carryover storage and needs determined by the water temperature objective.
		<ul style="list-style-type: none"> • October: wet, 2,500; above and below normal, 2,000; dry and critical, 1,750; and critical relaxation, 800; • November–February: wet, 2,500; above and below normal, 2,500; dry and critical, 1,750; and critical relaxation, 1,200; • March–May: wet, 4,500; above and below normal, 3,000; dry and critical, 2,000; and critical relaxation, 1,500; • June: wet, 4,500; above and below normal, 3,000; dry and critical, 2,000; and critical relaxation, 500; • July: wet, 2,500; above and below normal, 1,500; dry and critical, 1,500; and critical relaxation, 500; and • August: wet, 2,500; above and below normal, 2,000; dry and critical, 1,000; and critical relaxation, 500. 	E090102	Develop and implement a comprehensive watershed management plan for the American River Basin and lower American River to protect the channel (e.g., maintain flood-control capacity and reduce bank erosion) and preserve and restore the riparian corridor. Upper watershed health should be improved by reducing the potential for wildfires and implementing other watershed-management practices to protect streamflows, stream channel morphologies, spawning gravel condition, and riparian habitats, and minimize sediment input to the stream.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	American River Basin	Average flow targets for 10-day pulse (cfs), coordinated with flows from Shasta and Oroville Reservoirs, are:	E090103	Acquire water from willing sellers to augment river flow during the dry years to provide fishery benefits.
		<ul style="list-style-type: none"> March: wet, 6,000–7,000; above and below normal, 4,000–5,000; dry, 3,000–3,500; exceptions, only when inflows are sufficient; Late April or early May: wet, 7,000–8,000; above and below normal, 5,000–6,000; dry, 3,500–4,000; exceptions, only when inflows are sufficient. 		
		Minimize flow fluctuations below Nimbus Dam that can dewater salmonid redds and reduce survival of juvenile anadromous fish as a result of stranding and/or isolation from the main channel.	E090104	Complete ongoing collaborative efforts to develop flow ramping criteria and operationally implement these criteria to reduce adverse effects of flow fluctuation on lower American River fishery resources.
		Provide flows of suitable-quality water that more closely emulate natural annual and seasonal streamflow patterns in American River Basin watersheds.	E090105	Enter into agreements with water districts and wetland managers to provide return flows of high-quality water from irrigated agriculture and seasonal wetlands to the American River Basin.
			E090106	Enter into agreements with landowners and water districts to limit diversions of natural flows from creeks to improve streamflows.
			E090107	Limit diversion of natural streamflows from American River Basin creeks into irrigation canals and ditches by providing other sources of water or through purchase of water rights from willing sellers.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Yolo Basin	More closely emulate natural seasonal patterns in Cache and Putah Creeks by providing additional flows, when available, from existing water supplies. Flows in the Yolo Bypass would be supplemented, as needed, by the Colusa Basin drain through the Knights Landing Ridge Cut Canal, extending the Tehama-Colusa Canal, and the Sacramento River through the Fremont weir. Supplemental flows may be needed in fall if water temperature and flow in the lower Yolo Bypass are insufficient for passage from Cache Slough to upstream areas in the Sacramento River. Supplemental flows may be needed in winter and spring to sustain downstream-migrating juvenile salmon and steelhead on their journey through the Yolo Bypass to the Delta. Supplemental flows would be needed along with irrigation water from spring to fall to sustain native fish, wetlands, and riparian habitats in channel sloughs of the Yolo Bypass.	E100101	Develop a cooperative program to provide water for summer flows in Cache Creek to maintain riparian vegetation by developing new conjunctive supplies, including groundwater.
			E100102	Develop a cooperative program to provide water for target flows in Putah Creek from additional Lake Berryessa releases or reductions in water diversions at Solano Diversion Dam and in the creek downstream of the dam. Water would be obtained from willing sellers, water transfers, and by developing new supplies, including groundwater.
E2. Improvement in the supply of sediment to rivers and streams necessary to provide spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Sacramento River	Increase gravel recruitment in the upper Sacramento River between Keswick Dam and the Red Bluff Diversion Dam by 10,000–20,000 cubic yards annually to provide adequate spawning habitat for targeted levels of salmon and steelhead and to sustain stream meander processes below Red Bluff. (This is the estimated amount of spawning-sized gravel captured annually by Shasta Dam.)	E030201	Develop a cooperative program to stockpile gravel at strategic locations along the Sacramento River below Keswick Dam where riverflow will move gravel into the river channel to mimic natural gravel recruitment into the upper river. Determine the adequacy of this action and adjust amount and locations as necessary.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary to provide spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Sacramento River	Increase gravel recruitment in the upper Sacramento River between Keswick Dam and the Red Bluff Diversion Dam by 10,000–20,000 cubic yards annually to provide adequate spawning habitat for targeted levels of salmon and steelhead and to sustain stream meander processes below Red Bluff. (This is the estimated amount of spawning-sized gravel captured annually by Shasta Dam.)	E030202	Develop a cooperative program to reactivate gravel recruitment to the river by exposing existing sources of river gravel on islands, bars, and banks that have become armored to riverflows. This action should be implemented on a conservative basis because the availability of such in-channel gravel, costs of activating the gravel, indirect impacts, and potential effectiveness have not been determined.
		Preserve and improve the existing stream-meander belt in the Sacramento River between Chico Landing and Colusa by purchase in fee or through easements of 8,000–12,000 acres of riparian lands in the meander zone.	E030301	Develop a cooperative program to evaluate the feasibility of removing riprap from banks to the extent possible, consistent with flood control management, and reduce effects of other structures, such as bridges, to provide a sustainable meander corridor.
			E030302	Purchase easements to offset losses to property owners for land lost to meander process.
			E030303	Develop a cooperative program to evaluate the feasibility of removing riprap from banks to the extent possible, consistent with flood control management, and reduce effects of other structures, such as bridges, to provide a sustainable meander corridor.
			E030604	Purchase easements to offset losses to property owners for land lost to meander process.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary to provide spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	North Sacramento Valley	Provide conditions for growth of riparian vegetation along channelized portions of the Sacramento River.	E031602	Setback levees may be constructed on leveed reaches of the river to provide a wider floodplain and greater development of shaded riverine aquatic (SRA) habitat. Because of the potential indirect impacts on land use and uncertainty of cost and technical feasibility of setback levees, such development will be experimental and conservative, and will depend on adaptive management.
		Maintain existing levels of erosion and gravel recruitment in streams of the North Sacramento Valley Ecological Management Zone and, where necessary, supplement gravel recruitment through adaptive management and monitoring.	E040201	Cooperatively develop appropriate land use plans that allow the natural recruitment of sediments to streams in the North Sacramento Valley Ecological Management Zone.
		Increase existing levels of erosion and gravel recruitment in Clear Creek by 25–50 tons per year.	E040202	Develop a cooperative program to improve gravel quality and quantity in lower Clear Creek to maintain high-quality spawning conditions for fall-run and late-fall-run chinook salmon by evaluating the addition of 5,000–10,000 cubic yards annually as needed. Evaluate the need to acquire or relocate existing mining operations. Remove or alter Saeltzer Dam so that it no longer serves as a sediment trap.
		Increase existing levels of erosion and gravel recruitment in Cow Creek by 5–10 tons per year.	E040203	Develop a cooperative program to protect existing gravel and bedload movement in Cow Creek to maintain and increase future spawning gravel and sediment input to the Sacramento River by 5–10 tons per year by evaluating the need or opportunity to acquire or relocate existing gravel mining operations.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary for providing spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	North Sacramento Valley	Create a more defined stream channel in the lower 8 miles of Clear Creek to facilitate fish passage.	E040301	Develop a cooperative program to improve lower Clear Creek by maintaining flow connection with the Sacramento River and by regrading the channel and controlling vegetative encroachment.
		Reestablish natural floodplain and stream channel meander in the lower 8 miles of Clear Creek.	E040402	Acquire floodplains from willing sellers by direct purchase or easement.
	Cottonwood Creek	Maintain existing levels of erosion and gravel recruitment in streams in the Cottonwood Creek Ecological Zone and provide for increasing the transport of these sediments to the Sacramento River by an average of 30,000–40,000 tons per year.	E050201	Cooperatively develop and implement a gravel management program for Cottonwood Creek. The program would protect and maintain important ecological processes and functions related to sediment supply, gravel recruitment, and gravel cleansing and transport. This would involve working with State and local agencies and gravel operators to protect spawning gravel and enhance recruitment of spawning gravel to the Sacramento River in the valley sections of Cottonwood Creek.
		Repair and rehabilitate spawning gravels in 10–20 miles of the lower South Fork and mainstem of Cottonwood Creek.	E050202 E050203	Cooperate with the aggregate resource industry to relocate existing gravel operations on Cottonwood Creek to areas outside of the active streamchannel. In the short term, develop a cooperative program to rip and clean or reconstruct important salmon spawning riffles on the South Fork of Cottonwood Creek and on lower Cottonwood Creek below the South Fork.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary to provide spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Colusa Basin	Establish a desirable level of sediment deposition in the Colusa Basin.	E060401	Improve the Colusa Basin sediment deposition capacity by working with local landowners to develop an integrated plan consistent with flood control requirements.
	Butte Basin	Develop a cooperative program to replenish spawning gravel in Big Chico Creek, especially in stream reaches that have been modified for flood control so that there is no net loss of sediments transported through the Sycamore, Lindo Channel, and Big Chico Creek split.	E070201	Assist in the redesign of and reconstruct the flood control box culvert structures on Big Chico Creek near the Five-Mile Recreation Area to allow the natural downstream transport of stream sediments.
		Develop a cooperative program to improve fall-run chinook salmon spawning habitat in the lower 8 miles of Mill Creek.	E070202	Develop a cooperative program to improve chinook salmon spawning habitats in lower Mill Creek by reactivating and maintaining natural-sediment transport processes.
		Improve spawning gravel and gravel availability in Butte Creek.	E070203	Develop a cooperative program to improve spawning habitat in Butte Creek by maintaining natural-sediment transport processes.
	Feather River/Sutter Basin	Maintain existing levels of erosion and gravel recruitment in tributaries that sustain an adequate level of gravel recruitment, or restore desirable levels by directly manipulating and augmenting gravel supplies where the natural fluvial process has been interrupted by dams or other features that retain or remove the gravel supply.	E080201	Evaluate the quality of spawning gravel in areas used by chinook salmon in the Feather River. If indicated, renovate or supplement gravel supplies to enhance substrate quality by importing 4,000–8,000 tons of additional gravel below the hatchery as conditions require.
			E080202	Evaluate the quality of spawning gravel in areas used by chinook salmon in the Yuba River. If indicated, renovate or supplement gravel supplies to enhance substrate quality.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary to provide spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Feather River/Sutter Basin	Maintain existing levels of erosion and gravel recruitment in tributaries that sustain an adequate level of gravel recruitment, or restore desirable levels by directly manipulating and augmenting gravel supplies where the natural fluvial process has been interrupted by dams or other features that retain or remove the gravel supply.	E080203	Evaluate the quality of spawning gravel in areas used by chinook salmon in the Bear River. If indicated, renovate or supplement gravel supplies to enhance substrate quality.
		Preserve and expand the stream-meander belts in the Feather, Yuba, and Bear Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E080303	Develop a cooperative program to improve opportunities for natural meander by removing riprap and relocating other structures that impair stream meander.
	American River Basin	Maintain, improve, or supplement gravel recruitment and natural sediment transport in the lower American River and American River Basin watersheds to maintain natural ecological processes linked to stream channel maintenance, erosion and deposition, maintenance of spawning areas, and the regeneration of riparian vegetation.	E090201	Implement a pilot study to assess the benefits of mechanical cleaning to improve gravel permeability.
		Maintain the existing stream-meander configuration along the American River between Nimbus Dam and the Sacramento River.	E090401	Maintain a stream-meander configuration along the lower American River by working with involved parties to develop a floodplain management program consistent with flood-control needs. These parties include the U.S. Army Corps of Engineers (USACE), the California Reclamation Board, the Sacramento Area Flood Control Agency, the Lower American River Task Force, and the American River Water Forum.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary to provide spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	American River Basin	Restore natural stream meanders in the floodplains of American River Basin creeks.	E090403	Where possible within flood control constraints, restore natural meander belts along the lower creeks through setback of levees or removal of bank protection, or other physical structures impeding a natural meander process.
		Maintain and enhance floodplain overflow areas in the lower American River and floodplain of the American River Basin.	E090404	Set back levees in the floodplains of creeks and canals of the American River Basin.
			E090407	Enter into agreements with willing landowners and irrigation districts to set back levees and allow floodplain processes such as stream-meander belts.
			E090409	Reduce or eliminate gravel mining from active stream channels.
	Yolo Basin	Restore gravel recruitment in Cache and Putah Creeks to meet the needs of spawning fish, maintain natural stream channel meanders and bar formation where consistent with flood protection and adjoining land uses, and match existing rates of downstream displacement.	E100201	Develop a cooperative program to supplement gravel recruitment below Solano Diversion Dam as needed to replace natural gravel recruitment interrupted by these diversion dams.
			E100202	Develop a cooperative program to supplement gravel in areas downstream of the diversion dams where other structures or gravel mining have interrupted the gravel recruitment process.
		Protect, enhance, and restore natural gravel recruitment within the active floodplain and remnant gravel pits.	E105101	Develop a cooperative program to fill remnant gravel pits within the active floodplain of the creeks, and restore natural channel configurations where there are remnant gravel-mining effects.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E3. Maintenance of stream temperatures necessary to maintain anadromous fishes through management of reservoir releases or structural solutions. (This does not include the effect of restoration of riparian vegetation on maintaining stream temperatures).	Sacramento River	Maintain mean daily water temperatures at levels suitable for maintenance of all life-history stages of chinook salmon and steelhead in the Sacramento River between Keswick Dam and Red Bluff Diversion Dam in above-normal and wet years, and between Keswick Dam and Red Bluff Diversion Dam in other year types.	E030501	Cooperatively develop and implement a balanced river regulation program that provides sufficient carryover storage at Shasta Dam to ensure that suitably low water temperatures are reached to protect chinook salmon spawning, incubating eggs, and young fish, particularly in consecutive dry and critically dry years.
	Feather River/Sutter Basin	Improve water quality conditions in the Feather, Yuba, and Bear Rivers to benefit anadromous fish.	E080501	Develop a cooperative program to identify and remove physical and water quality barriers in the Feather River that impede access for white and green sturgeon to spawning habitat, or facilitate passage around these barriers.
			E080502	Develop a cooperative approach to operating reservoirs in the Yuba River watershed to provide adequate water temperatures for anadromous fish.
			E080503	Develop a cooperative program to maintain mean daily water temperatures between 61°F and 65°F for at least 1 month from April 1 to June 30 for American shad spawning in the Feather River, consistent with actions to protect chinook salmon and steelhead and when hydrologic conditions are adequate to minimize adverse effects on water supply operations.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E3. Maintenance of stream temperatures necessary to maintain anadromous fishes through management of reservoir releases or structural solutions (i.e., does not include the effect of restoration of riparian vegetation on maintaining stream temperatures).	Feather River/ Sutter Basin	Improve water quality conditions in the Feather, Yuba, and Bear Rivers to benefit anadromous fish.	E080504	Evaluate whether improving water temperature control with shutter configuration and present management of the coldwater pool at New Bullards Bar Dam on the Yuba River is effective. Modify the water release outlets at Englebright Dam if these improvements are effective.
			E080505	Develop a cooperative program to maintain mean daily water temperatures between 61°F and 65°F for at least 1 month from April 1 to June 30 for American shad spawning in the Yuba River, consistent with actions to protect chinook salmon and steelhead and when hydrologic conditions are adequate to minimize adverse effects on water supply operations.
			E080506	Develop a cooperative approach to providing adequate water temperatures in the Bear River for all life stages of chinook salmon and steelhead.
	American River Basin	Maintain lower American River water temperatures in the upper portion of the reach between Nimbus Dam and Sunrise Bridge and in the upper portions of Coon Creek, Doty Creek, Auburn Ravine, and Secret Ravine in the American Basin below 65°F. Maintain lower American River water temperatures in the spawning and rearing reach between Arden Bar and Nimbus Dam at or below 60°F beginning as early in October as possible, based on annual coldwater pool availability.	E090501	Optimally manage Folsom Reservoir's coldwater pool via real-time operation of the water release shutters to provide the maximum equitable thermal benefits to lower American River steelhead and chinook salmon throughout the year, within the constraints of reservoir coldwater pool availability.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E3. Maintenance of stream temperatures necessary to maintain anadromous fishes through management of reservoir releases or structural solutions (i.e., does not include the effect of restoration of riparian vegetation on maintaining stream temperatures).	American River Basin	Maintain lower American River water temperatures in the upper portion of the reach between Nimbus Dam and Sunrise Bridge and in the upper portions of Coon Creek, Doty Creek, Auburn Ravine, and Secret Ravine in the American Basin below 65°F. Maintain lower American River water temperatures in the spawning and rearing reach between Arden Bar and Nimbus Dam at or below 60°F beginning as early in October as possible, based on annual coldwater pool availability.	E090502	Reconfigure Folsom Dam shutters to improve management of Folsom Reservoir's coldwater pool and maintain better control over the temperature of water release downstream.
			E090503	Install a temperature control device at the urban water intakes at Folsom Dam. Doing so would facilitate diverting water at elevations above 317 mean sea level (msl), which would preserve the reservoir's coldwater pool for release to the lower American River.
E6. Restoration and maintenance of riverine aquatic habitats.	Sacramento River	Provide conditions for growth of riparian vegetation along channelized portions of the Sacramento River.	E031602	Setback levees may be constructed on leveed reaches of the river to provide a wider floodplain and greater development of SRA habitat. Because of the potential indirect impacts on land use and uncertainty of cost and technical feasibility of setback levees, such development will be experimental and conservative, and will depend on adaptive management.
		Preserve and improve the existing stream-meander belt in the Sacramento River between Red Bluff and Chico Landing by purchase in fee or through easements of 8,000–12,000 acres of riparian lands in the meander zone.	E030301	Develop a cooperative program to evaluate the feasibility of removing riprap from banks to the extent possible, consistent with flood control management, and reduce effects of other structures, such as bridges, to provide a sustainable meander corridor.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E6. Restoration and maintenance of riverine aquatic habitats.	Sacramento River	Preserve and improve the existing stream-meander belt in the Sacramento River between Red Bluff and Chico Landing by purchase in fee or through easements of 8,000–12,000 acres of riparian lands in the meander zone.	E030302	Purchase easements to offset losses to property owners for land lost to meander process.
			E030303	Develop a cooperative program to evaluate the feasibility of removing riprap from banks to the extent possible, consistent with flood control management, and reduce effects of other structures, such as bridges, to provide a sustainable meander corridor.
			E030604	Purchase easements to offset losses to property owners for land lost to meander process.
	North Sacramento Valley	Create a more defined stream channel in the lower 8 miles of Clear Creek to facilitate fish passage.	E040301	Develop a cooperative program to improve lower Clear Creek by maintaining flow connection with the Sacramento River and by regrading the channel and controlling vegetative encroachment.
		Reestablish natural floodplain and stream channel meander in the lower 8 miles of Clear Creek.	E040402	Acquire floodplains from willing sellers by direct purchase or easement.
	Cottonwood Creek	Maintain existing levels of erosion and gravel recruitment in streams in the Cottonwood Creek Ecological Zone and provide for increasing the transport of these sediments to the Sacramento River by an average of 30,000–40,000 tons per year.	E050201	Cooperatively develop and implement a gravel-management program for Cottonwood Creek. The program would protect and maintain important ecological processes and functions related to sediment supply, gravel recruitment, and gravel cleansing and transport. This would involve working with State and local agencies and gravel operators to protect spawning gravel and enhance recruitment of spawning gravel to the Sacramento River in the valley sections of Cottonwood Creek.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E6. Restoration and maintenance of riverine aquatic habitats.	Cottonwood Creek	Maintain existing levels of erosion and gravel recruitment in streams in the Cottonwood Creek Ecological Zone and provide for increasing the transport of these sediments to the Sacramento River by an average of 30,000–40,000 tons per year.	E050202	Cooperate with the aggregate resource industry to relocate existing gravel operations on Cottonwood Creek to areas outside of the active stream channel.
		Repair and rehabilitate spawning gravels in 10–20 miles of the lower South Fork and mainstem of Cottonwood Creek.	E050203	In the short term, develop a cooperative program to rip and clean or reconstruct important salmon spawning riffles on the South Fork of Cottonwood Creek and on lower Cottonwood Creek below the South Fork.
		Preserve or restore the 50- to 100-year floodplain and existing channel-meander characteristics of streams in the Cottonwood Creek Ecological Zone, particularly in low-gradient areas throughout the lower 20 miles where most deposition occurs and where stream channel meander is most pronounced.	E050301	In the short term, develop a cooperative program to mechanically create a more defined stream channel in lower Cottonwood Creek to facilitate fish passage by minimizing water infiltration through the streambed and maintaining flow connectivity with the Sacramento River until natural meander returns.
		Develop a cooperative program to identify opportunities to allow Cottonwood Creek to seasonally inundate its floodplain.	E050401	Minimize adverse effects of permanent structures such as bridges on floodplain processes.
		Restore upper watershed health.	E050402	Reduce excessive fire fuel loads in upper watersheds.
			E050403	Improve forestry management practices, including timber harvest, road building and maintenance, and livestock grazing practices.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E6. Restoration and maintenance of riverine aquatic habitats.	Cottonwood Creek	Protect, restore, and maintain the Cottonwood Creek watershed by eliminating conflict between land use practices and watershed health.	E050404	Cooperatively work with landowners and federal land management agencies to facilitate watershed protection and restoration and reduce siltation to improve holding, spawning, and rearing habitats for salmonids.
			E050405	Develop a cooperative program to implement improved fencing, grazing, and other land-management practices on private and national forest lands, and encourage local counties to adopt stronger grading and road-building ordinances to control erosion.
	Colusa Basin	Establish a desirable level of sediment deposition in the Colusa Basin.	E060401	Improve the Colusa Basin sediment deposition capacity by working with local landowners to develop an integrated plan consistent with flood control requirements.
	Butte Basin	Develop a cooperative program to replenish spawning gravel in Big Chico Creek, especially in stream reaches that have been modified for flood control so that there is no net loss of sediments transported through the Sycamore, Lindo Channel, and Big Chico Creek split.	E070201	Assist in the redesign of and reconstruct the flood control box culvert structures on Big Chico Creek near the Five-Mile Recreation Area to allow the natural downstream transport of stream sediments.
		Develop a cooperative program to improve fall-run chinook salmon spawning habitat in the lower 8 miles of Mill Creek.	E070202	Develop a cooperative program to improve chinook salmon spawning habitats in lower Mill Creek by reactivating and maintaining natural-sediment transport processes.
		Improve spawning gravel and gravel availability in Butte Creek.	E070203	Develop a cooperative program to improve spawning habitat in Butte Creek by maintaining natural-sediment transport processes.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E6. Restoration and maintenance of riverine aquatic habitats.	Feather River/Sutter Basin	Preserve and expand the stream-meander belts in the Feather, Yuba, and Bear Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E080301	Acquire riparian and meander-zone lands by purchasing them directly or acquiring easements from willing sellers, or provide incentives for voluntary efforts to preserve and manage riparian areas on private land.
			E080302	Build local support for maintaining active meander zones by establishing a mechanism whereby property owners would be reimbursed for land lost to natural meander processes.
			E080303	Develop a cooperative program to improve opportunities for natural meander by removing riprap and relocating other structures that impair stream meander.
		Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.	E080401	As needed, restore stream channel and overflow basin configurations within the floodplain.
			E080402	Minimize effects of permanent structures, such as bridges and diversion dams, on floodplain processes.
	American River Basin	Maintain the existing stream-meander configuration along the American River between Nimbus Dam and the Sacramento River.	E090401	Maintain a stream-meander configuration along the lower American River by working with involved parties to develop a floodplain management program consistent with flood control needs. These parties include USACE, the California Reclamation Board, the Sacramento Area Flood Control Agency, the Lower American River Task Force, and the American River Water Forum.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E6. Restoration and maintenance of riverine aquatic habitats.	American River Basin	Maintain the existing stream-meander configuration along the American River between Nimbus Dam and the Sacramento River.	E090402	Where possible, maintain mainstem and side-channel habitats typical of a natural river that provide salmon and steelhead spawning and rearing habitat.
		Restore natural stream meanders in the floodplains of American River Basin creeks.	E090403	Where possible within flood control constraints, restore natural meander belts along the lower creeks through setback of levees or removal of bank protection, or other physical structures impeding a natural meander process.
		Maintain and enhance floodplain overflow areas in the lower American River and floodplain of the American River Basin.	E090404	Set back levees in the floodplains of creeks and canals of the American River Basin.
			E090407	Enter into agreements with willing landowners and irrigation districts to set back levees and allow floodplain processes such as stream meander belts.
			E090408	Expand existing floodplain overflow basins by obtaining easements of titles from willing sellers of floodplain lands.
		Enhance SRA habitat in American River Basin creeks and drainage canals and ditches and along the lower American River.	E091604	Terminate or modify current programs that remove woody debris from the river and creek channels.
			E091605	Restore side channels along the lower American River to provide additional riparian corridors for increasing fish and wildlife habitat.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E6. Restoration and maintenance of riverine aquatic habitats.	American River Basin	Maintain, improve, or supplement gravel recruitment and natural sediment transport in the lower American River and American Basin watersheds to maintain natural ecological processes linked to stream channel maintenance, erosion and deposition, maintenance of spawning areas, and the regeneration of riparian vegetation.	E090201	Implement a pilot study to assess the benefits of mechanical cleaning to improve gravel permeability.
E13c. Enhancement and management of up to 73,325 acres of existing seasonal wetlands for wildlife.	Colusa Basin	Protect and manage 2,000 acres of existing seasonal wetland habitat consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E061501	Develop and implement a cooperative program to improve management of 2,000 acres of existing, degraded seasonal wetland habitat.
		Develop and implement a cooperative program to enhance 26,435 acres of existing public and private seasonal wetland habitat consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E061502	Restore and manage seasonal wetland habitat throughout the ecological zone.
	Butte Basin	Assist in protecting 10,000 acres of existing seasonal wetland habitat through fee acquisition or perpetual easements consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E071501	Develop and implement a cooperative program to improve management of 10,000 acres of existing, degraded seasonal wetland habitat.
		Develop and implement a cooperative program to enhance 26,150 acres of existing public and private seasonal wetland habitat consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E071502	Restore and manage seasonal wetland habitat throughout the ecological zone.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E13c. Enhancement and management of up to 73,325 acres of existing seasonal wetlands for wildlife.	Feather River/Sutter Basin	Assist in protecting 500 acres of existing seasonal wetland habitat through fee acquisition or perpetual easements consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E081501	Develop and implement a cooperative program to improve management of 500 acres of existing, degraded seasonal wetland habitat in the Sutter Bypass Ecological Unit.
		Develop and implement a cooperative program to enhance 3,090 acres of existing public and private seasonal wetland habitat consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E081502	Restore and manage seasonal wetland habitat throughout the Sutter Bypass Ecological Management Unit.
	American River Basin	Maintain and enhance floodplain overflow areas in the lower American River and floodplain of the American River Basin.	E090405	Protect existing overflow areas from future reclamation.
		Maintain and enhance floodplain overflow areas in the lower American River and floodplain of the American River Basin.	E090406	Develop floodway detention basins in the floodplains of the American Basin to temporarily store floodwaters.
		Protect and enhance 5,150 acres of seasonal wetland habitat acreage in the American River Basin consistent with the objectives of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E091501	Protect 2,000 acres of existing wetland habitat through fee acquisition and perpetual conservation easements.
			E091502	Enhance 3,150 acres of existing wetlands.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of riparian habitat associated with enhancement of 17,000–25,000 acres of meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of up to 3,635 acres of riparian habitat and SRA cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Sacramento River	Provide conditions for growth of riparian vegetation along channelized portions of the Sacramento River.	E031601	Develop a cooperative program to plant vegetation on unvegetated, riprapped banks consistent with flood control requirements. Implementation will occur in phases, results will be monitored, and restoration approach will be adjusted as necessary under adaptive management.
			E031602	Setback levees may be constructed on leveed reaches of the river to provide a wider floodplain and greater development of SRA habitat. Because of the potential indirect impacts on land use and uncertainty of cost and technical feasibility of setback levees, such development will be experimental and conservative, and will depend on adaptive management.
		Increase the ecological value of low-to-moderate-quality SRA habitat by changing land use and land management practices.	E031603	Purchase property or easements and allow habitat to improve naturally. Properties to be considered should be developed through a process of prioritizing based on quality and importance of habitat, technical feasibility and cost of purchase and improvement, and consent of landowners.
			E031604	Provide incentives and technical support for private landowners to protect and improve existing SRA habitat.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of riparian habitat associated with enhancement of 17,000–25,000 acres of meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of up to 3,635 acres of riparian habitat and SRA cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Sacramento River	Maintain existing streamside riparian vegetation.	E031605	Through purchase, conservation easement, and voluntary participation of landowners, protect SRA habitat from development. Where high-priority properties are already in government ownership or available for purchase or easement, preservation efforts should be undertaken as experiments to develop technical details, cost effectiveness, and overall approach and consensus for the program. Full implementation of this program would depend on results of experiments and subject to adaptive management.
			E030302	Purchase easements to offset losses to property owners for land lost to meander process.
		Preserve and improve the existing stream meander belt in the Sacramento River between Chico Landing and Colusa by purchase in fee or through easements of 8,000–12,000 acres of riparian lands in the meander zone.	E030303	Develop a cooperative program to evaluate the feasibility of removing riprap from banks to the extent possible, consistent with flood management requirements, and reduce effects of other structures, such as bridges, to provide a sustainable meander corridor.
			E030304	Purchase easements to offset losses to property owners for land lost to meander process.
		Reduce the area of invasive non-native woody species, such as giant reed and salt cedar, that compete with native riparian vegetation.	E035301	Implement a program along the length of the Sacramento River to remove and suppress the spread of invasive non-native plants that compete with native riparian vegetation.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of riparian habitat associated with enhancement of 17,000–25,000 acres of meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of up to 3,635 acres of riparian habitat and SRA cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Sacramento River	Reduce the area of invasive non-native woody species, such as giant reed and salt cedar, that compete with native riparian vegetation.	E035302	Implement a program to eliminate invasive woody plants that could interfere with the restoration of native riparian vegetation.
	North Sacramento Valley	Create a more defined stream channel in the lower 8 miles of Clear Creek to facilitate fish passage.	E040301	Develop a cooperative program to improve lower Clear Creek by maintaining flow connection with the Sacramento River and by regrading the channel and controlling vegetative encroachment.
		Reestablish natural floodplain and stream channel meander in the lower 8 miles of Clear Creek.	E040401	Acquire floodplains from willing sellers by direct purchase or easement.
		Develop a cooperative program to establish riparian habitat zones along streams in the North Sacramento Valley Ecological Zone through conservation easements, fee acquisition, or voluntary landowner measures.	E041601	Develop a cooperative program to establish, restore, and maintain riparian habitat on Clear Creek through conservation easements, fee acquisition, or voluntary landowner cooperation.
			E041602	Encourage the development of long-term measures in the comprehensive watershed management plan to further improve water temperatures. Develop a cooperative approach with counties and local agencies to implement land use management that protects riparian vegetation along the streams and develop programs to restore lost riparian vegetation.
			E041603	Cooperatively negotiate long-term agreements with local landowners to maintain and restore riparian communities along the lower reaches of Cow, Bear, and Battle Creeks.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of riparian habitat associated with enhancement of 17,000–25,000 acres of meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of up to 3,635 acres of riparian habitat and SRA cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Cottonwood Creek	Develop a cooperative program to establish a continuous 130-mile riparian habitat zone along upper and lower Cottonwood Creek and its tributaries through conservation easements, fee acquisition, or voluntary landowner measures.	E051601	Develop a cooperative program to establish, restore, and maintain riparian habitat on Cottonwood Creek through conservation easements, fee acquisition, or voluntary landowner cooperation.
			E051602	Encourage the development of long-term measures in the comprehensive watershed management plan to further improve water temperatures. Develop a cooperative approach with counties and local agencies to implement land use management to protect riparian vegetation along the streams and developing programs to restore lost riparian vegetation.
			E051603	Cooperatively negotiate long-term agreements with local landowners to maintain and restore riparian communities along the lower reaches of Cottonwood Creek.
	Colusa Basin	Protect and maintain riparian vegetation along Stony Creek, Elder Creek, and the Colusa Basin Ecological Unit channels and sloughs where possible. This will provide cover and other essential habitat requirements for native resident fish species and wildlife.	E061601	Develop a cooperative program to restore riparian vegetation where possible.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of riparian habitat associated with enhancement of 17,000–25,000 acres of meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of up to 3,635 acres of riparian habitat and SRA cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Colusa Basin	Eradicate arundo (false bamboo) and tamarisk (salt cedar) in watersheds where they have only small population, then concentrate on eradicating satellite populations extending beyond major infestations, and finally, reduce and eventually eliminate the most extensive populations.	E065301	Develop a cooperative pilot study to control arundo and tamarisk in streams within the Colusa Basin Ecological Zone.
	Butte Basin	Develop a cooperative program to restore and maintain riparian habitat along the lower 10 miles of Mill Creek.	E071601	Develop a cooperative program to restore and maintain riparian habitat along Mill Creek through acquisition of conservation easement or by voluntary landowner participation.
		Develop a cooperative program to restore and maintain riparian habitat along Big Chico Creek.	E071603	Cooperate with local landowners to encourage revegetation of denuded stream reaches and to establish, restore, and maintain riparian habitat on Big Chico Creek.
			E071604	Cooperate with local landowners to encourage revegetation of denuded stream reaches and to establish, restore, and maintain riparian habitat on Butte Creek.
	Feather River/Sutter Basin	Preserve and expand the stream-meander belts in the Feather, Yuba, and Bear Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E080301	Acquire riparian and meander-zone lands by purchasing them directly or acquiring easements from willing sellers, or provide incentives for voluntary efforts to preserve and manage riparian areas on private land.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of riparian habitat associated with enhancement of 17,000–25,000 acres of meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of up to 3,635 acres of riparian habitat and SRA cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Feather River/Sutter Basin	Preserve and expand the stream-meander belts in the Feather, Yuba, and Bear Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E080302	Build local support for maintaining active meander zones by establishing a mechanism whereby property owners would be reimbursed for land lost to natural meander processes.
			E080303	Develop a cooperative program to improve opportunities for natural meander by removing riprap and relocating other structures that impair stream meander.
		Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.	E080401	As needed, restore stream channel and overflow basin configurations within the floodplain.
		Provide conditions for growth of riparian vegetation along sections of rivers in the Feather River/Sutter Basin Ecological Zone.	E081601	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Yuba River.
		Preserve and expand the stream-meander belts in the Feather, Yuba, and Bear Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E081602	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Feather River.
			E081603	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Bear River.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of riparian habitat associated with enhancement of 17,000–25,000 acres of meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of up to 3,635 acres of riparian habitat and SRA cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	American River Basin	Maintain the existing stream-meander configuration along the American River between Nimbus Dam and the Sacramento River.	E090401	Maintain a stream-meander configuration along the lower American River by working with involved parties to develop a floodplain management program consistent with flood-control needs. These parties include USACE, the California Reclamation Board, the Sacramento Area Flood Control Agency, the Lower American River Task Force, and the American River Water Forum.
		Restore natural stream meanders in the floodplains of American River Basin creeks.	E090403	Where possible within flood control constraints, restore natural meander belts along the lower creeks through setback of levees or removal of bank protection, or other physical structures impeding a natural meander process.
		Maintain and enhance floodplain overflow areas in the lower American River and floodplain of the American River Basin.	E090404	Set back levees in the floodplains of creeks and canals of the American River Basin.
			E090407	Enter into agreements with willing landowners and irrigation districts to set back levees and allow floodplain processes such as stream-meander belts.
		Establish and/or maintain a sustainable continuous corridor of riparian habitat along the lower American River and American River Basin creeks.	E091601	Protect riparian habitat along watercourses of the American River Basin.
			E091602	Plant riparian vegetation along watercourses of the American Basin.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of riparian habitat associated with enhancement of 17,000–25,000 acres of meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of up to 3,635 acres of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	American River Basin	Establish and/or maintain a sustainable continuous corridor of riparian habitat along the lower American River and American River Basin creeks.	E091603	Reduce land use practices such as livestock grazing and watering along stream channels of the American River Basin that cause degradation of riparian habitat.
		Enhance SRA habitat in American River Basin creeks and drainage canals and ditches and along the lower American River.	E091606	Improve levee-management practices to protect and enhance riparian and SRA habitat.
		Reduce populations of invasive non-native plants that compete with the establishment and succession of native riparian vegetation along the American River. This will help to reestablish native riparian vegetation in floodplains, increase SRA cover, and increase habitat values for riparian-associated wildlife.	E095301	Reduce populations of invasive non-native plants that compete with the establishment and succession of native riparian vegetation along the American River. This will help to reestablish native riparian vegetation in floodplains, increase SRA cover, and increase habitat values for riparian-associated wildlife.
	Yolo Basin	Restore riparian vegetation along Cache Creek, Putah Creek, and Yolo Bypass and Solano Ecological Unit channels and sloughs where possible to provide cover and other essential habitat requirements for salmon, steelhead, native resident fish species, and other wildlife.	E101601	Develop a cooperative program to restore riparian vegetation where possible and fill gaps in forest continuity.
			E101602	Develop a cooperative program to protect existing riparian corridors along creeks, streams, sloughs, and channels connecting to the Delta.
			E101603	Develop a cooperative program to plant riparian vegetation and provide for early development until it becomes naturally self-sustaining.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15c. Protection and enhancement of riparian habitat associated with enhancement of 17,000–25,000 acres of meander zones along the Sacramento River and its tributaries; protection, enhancement, and restoration of up to 3,635 acres of riparian habitat and shaded riverine aquatic (SRA) cover along other reaches of the Sacramento River and its tributaries; and reduction of populations of non-native invasive plants.	Yolo Basin	Restore riparian vegetation along Cache Creek, Putah Creek, and Yolo Bypass and Solano Ecological Unit channels and sloughs where possible to provide cover and other essential habitat requirements for salmon, steelhead, native resident fish species, and other wildlife.	E101604	Develop a cooperative control program for non-native riparian plants where necessary to ensure development of healthy natural riparian corridors.
		Reduce populations of invasive non-native plant species that compete with the establishment and succession of native riparian vegetation along Cache Creek and Putah Creek. Reducing populations of these species would assist in the natural reestablishment of native riparian vegetation in floodplains, increase SRA cover for fish, and increase habitat values for riparian-associated wildlife.	E105301	Develop a cooperative program to monitor the distribution and abundance of non-native plants and develop cooperative control programs as needed.
E16c. Restoration of perennial grassland associated with existing or restored wetlands in the American River Basin.	American River Basin	Restore perennial grasslands in the American River Basin Ecological Management Unit associated with existing or proposed wetlands.	E091801	Develop a cooperative program to restore perennial grasslands by acquiring conservation easements or purchasing land from willing sellers.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E18b. Cooperative management of up to 298,643 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.	Colusa Basin	Cooperatively manage 111,285 acres of agricultural lands.	E061901	Increase the area of rice fields and other croplands flooded in winter and spring to provide high-quality foraging habitat for wintering and migrating waterfowl and shorebirds and associated wildlife.
			E061902	Convert agricultural lands in the Colusa Basin Ecological Zone from crop types of low forage value for wintering waterfowl and other wildlife to crop types of greater forage value.
			E061903	Defer fall tillage on rice fields in the Colusa Basin Ecological Zone to increase the forage for wintering waterfowl and associated wildlife.
	Butte Basin	Cooperatively manage 108,832 acres of agricultural lands.	E071901	Increase the area of rice fields and other croplands flooded in winter and spring to provide high-quality foraging habitat for wintering and migrating waterfowl and shorebirds and associated wildlife.
			E071902	Convert agricultural lands in the Butte Basin Ecological Zone from crop types of low forage value for wintering waterfowl and other wildlife to crop types of greater forage value.
			E071903	Defer fall tillage on rice fields in the Butte Basin Ecological Zone to increase the forage for wintering waterfowl and associated wildlife.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E18b. Cooperative management of up to 298,643 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.	Feather River/Sutter Basin	Cooperatively manage 57,578 acres of agricultural lands in a manner consistent with the objectives of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E081901	Increase the area of rice fields and other croplands flooded in winter and spring to provide high-quality foraging habitat for wintering and migrating waterfowl and shorebirds and associated wildlife.
	American River Basin	Restore and maintain migration corridors.	E091901	Purchase land or conservation easements from willing sellers on which to restore wildlife habitat to connect existing grassland or agricultural wildlife habitat.
		Enhance 20,948 acres of private agricultural land to better support nesting and wintering waterfowl in a manner consistent with the objectives of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E091902	Develop cooperative programs with farmers to conduct wildlife-friendly practices.
E22. Reduction in the adverse effects of diversions on fish.	Sacramento River	Reduce entrainment of juvenile salmon, steelhead, sturgeon, and splittail into water diversions to levels that will not impair stock rebuilding or species restoration.	E034701	Develop a cooperative program to screen all diversions greater than 250 cfs and one-third to two-thirds of all smaller unscreened diversions. This programmatic level of action should be sufficient to provide the data necessary to modify this target through adaptive management.
			E034702	Develop a cooperative program to upgrade screening at diversions where current screening is ineffective. Where existing screening has proven less than effective and entrainment problems continue, immediate action should be taken to upgrade screens.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E22. Reduction in the adverse effects of diversions on fish.	Sacramento River	Reduce entrainment of juvenile salmon, steelhead, sturgeon, and splittail into water diversions to levels that will not impair stock rebuilding or species restoration.	E034703	Develop a cooperative program to reduce diversions when juvenile salmon are present in large or significant numbers. Even with screens, some diversions may pose a threat to young salmon and steelhead, and it may be necessary to modify diversion operations. Such determinations will be made after necessary monitoring and evaluation, on a case-by-case basis, with agency and stakeholder involvement. Consideration will be given to appropriate alternatives.
			E034704	Promote and support relocating water diversions and developing alternate methods of supplying water from the Sacramento River that protect fish but also minimize conflict with the maintenance of dynamic fluvial river processes.
	North Sacramento Valley	Reduce or eliminate conflicts between the diversion of water and chinook salmon and steelhead populations at all diversion sites on Battle Creek.	E044701	Develop a cooperative approach to improve conditions for anadromous fish in Battle Creek by installing fish screens at four diversions on the North Fork, three diversions on the South Fork, and one diversion on the mainstem; or acquire water rights to eliminate the need for diversion and screening.
		Reduce or eliminate conflicts between the diversion of water and chinook salmon and steelhead populations at all diversion sites on Clear Creek.	E044702	Improve the survival of adult salmon and steelhead in Battle Creek by installing a rack at the head of Gover Diversion Canal to prevent straying.
			E044703	Acquire water rights on Clear Creek at the McCormick-Saeltzer Dam to eliminate the need for diversion.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E22. Reduction in the adverse effects of diversions on fish.	North Sacramento Valley	Work with landowners and diverters in Cow Creek to reduce the adverse effects of 13 seasonal diversion dams in South Cow Creek, 10 diversion dams in Old Cow Creek, two diversion dams in North Cow Creek, and one diversion dam in Clover Creek that are barriers to migrating chinook salmon and steelhead. Doing so will allow access to 100% of the habitat below any natural bedrock falls.	E044801	Improve passage conditions in Cow Creek by acquiring water rights from willing sellers, removing diversions, or providing alternative sources of water during important periods.
		Work with landowners and diverters in Bear Creek to reduce the adverse effects of dewatering the stream channel at seasonal diversion dams, which prevents passage by migrating chinook salmon.	E044802	Improve passage and habitat conditions in Bear Creek by acquiring water rights from willing sellers, evaluating the removal of diversion dams, or providing alternative sources of water during important periods.
		Work with landowners, diverters, and other State or federal agencies managing Battle Creek to improve fish passage.	E044803	Develop a cooperative program to upgrade or replace existing fish ladders or evaluate the removal of diversion dams and other impediments to passage.
	Butte Basin	Improve the survival of chinook salmon and steelhead in Butte Creek by cooperating in the installation of positive-barrier fish screens.	E074701	Improve the survival of juvenile chinook salmon and steelhead in Butte Creek by supporting the installation of screened portable pumps as an alternative to the Little Dry Creek diversion.
			E074702	Increase the survival of juvenile chinook salmon and steelhead in Butte Creek by helping local interests install positive-barrier fish screens at the Durham-Mutual Diversion Dam.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E22. Reduction in the adverse effects of diversions on fish.	Butte Basin	Improve the survival of chinook salmon and steelhead in Butte Creek by cooperating in the installation of positive-barrier fish screens.	E074703	Increase the survival of juvenile chinook salmon and steelhead in Butte Creek by helping local interests install positive-barrier fish screens at Adams Dam.
			E074704	Increase the survival of juvenile salmon and steelhead in Butte Creek by helping local interests install positive-barrier fish screens at Gorrill Dam.
	Feather River/Sutter Basin	Improve the survival of juvenile anadromous fish in the Yuba River by installing, upgrading, or replacing fish screens.	E084701	Develop a cooperative program to improve efficiency of screening devices in the Yuba River at the Hallwood-Cordua water diversion; construct screens at the Brown's Valley water diversion and other unscreened diversions.
			E084703	Develop a cooperative program to evaluate and screen diversions in the Bear River to protect all life stages of anadromous fish.
			E084704	Develop a cooperative program to evaluate and screen diversions in the Feather River to protect all life stages of anadromous fish.
	American River Basin	Reduce losses of juvenile salmon and steelhead in the lower American River and American River Basin creeks resulting from entrainment at water intake structures.	E094701	Upgrade the fish screens at the Fairbairn Water Treatment Plant to comply with DFG and National Marine Fisheries Service (NMFS) fish-screening criteria.
			E094702	Screen diversion from the Natomas Cross Channel (NCC), Natomas East Main Drainage Canal (NEMDC), Dry Creek, Coon Creek, and Auburn Ravine that operate during times when salmon and steelhead juveniles are present.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E22. Reduction in the adverse effects of diversions on fish.	Yolo Basin	Screen all diversions in the Yolo Bypass channels and sloughs.	None.	None.
			E104701	Develop a cooperative program to construct a weir or screen at the lower end of the Knights Landing Ridge Cut Canal to keep adult salmon and steelhead from migrating into the Colusa Drain.
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement.	Sacramento River	Minimize survival problems for adult and juvenile anadromous fish at the Red Bluff Diversion Dam by permanently raising the gates during the nonirrigation season and improving passage facilities during the irrigation season.	E034801	Upgrade fish passage facilities at the Red Bluff Diversion Dam.
		Reduce blockage to fish migrations at the Anderson-Cottonwood Irrigation District (ACID) dam.	E034802	Evaluate the need to upgrade fish passage facilities at the ACID dam.
	North Sacramento Valley	Reduce or eliminate conflicts between the diversion of water and chinook salmon and steelhead populations at all diversion sites in Battle Creek.	E044702	Improve the survival of adult salmon and steelhead in Battle Creek by installing a rack at the head of Gover Diversion Canal to prevent straying.
		Work with landowners and diverters in Cow Creek to reduce the adverse effects of 13 seasonal diversion dams in South Cow Creek, 10 diversion dams in Old Cow Creek, two diversion dams in North Cow Creek, and one diversion dam in Clover Creek that are barriers to migrating chinook salmon and steelhead. Doing so will allow access to 100% of the habitat below any natural bedrock falls.	E044801	Improve passage conditions in Cow Creek by acquiring water rights from willing sellers, removing diversions, or providing alternative sources of water during important periods.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement.	North Sacramento Valley	Work with landowners and diverters in Bear Creek to reduce the adverse effects of dewatering the stream channel at seasonal diversion dams, which prevents passage by migrating chinook salmon.	E044802	Improve passage and habitat conditions in Bear Creek by acquiring water rights from willing sellers, evaluating the removal of diversion dams, or providing alternative sources of water during important periods.
		Work with landowners, diverters, and other State or federal agencies managing Battle Creek to improve fish passage.	E044803	Develop a cooperative program to upgrade or replace existing fish ladders or evaluate the removal of diversion dams and other impediments to passage.
		Work with landowners and diverters on Clear Creek to improve fish passage between its mouth and Whiskeytown Dam.	E044804	Develop a cooperative program to improve fish passage on Clear Creek by upgrading or replacing the fish ladder at McCormick Dam.
		Reduce or eliminate conflicts in Battle Creek that require exclusion of anadromous fish from the upper section to protect the Coleman National Fish Hatchery water supply.	E044805	Develop an alternative or disease-free water supply for the hatchery to allow naturally spawning salmon and steelhead access to the full 41-mile reach of Battle Creek above the Coleman National Fish Hatchery weir.
	Butte Basin	Improve chinook salmon and steelhead survival in Antelope Creek by developing a cooperative program to reduce the use of seasonal diversion dams by 50% during the late spring, early fall, and winter.	E074801	Develop a cooperative program to evaluate the reduced use of seasonal diversion dams that may be barriers to migrating chinook salmon and steelhead in Antelope Creek by acquiring water rights or providing alternate sources of water.
		Develop a cooperative program to improve the upstream passage of adult chinook salmon and steelhead in Big Chico Creek by providing access to 100% of habitat located below natural barriers.	E074802	Repair or reconstruct the fish ladders in Big Chico Creek to improve opportunities for the upstream passage of adult spring-run chinook salmon and steelhead trout.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement.	Butte Basin	Develop a cooperative program to improve the upstream passage of adult chinook salmon and steelhead in Big Chico Creek by providing access to 100% of habitat located below natural barriers.	E074803	Repair the Lindo Channel weir and fishway at the Lindo Channel box culvert at the Five Mile Diversion to improve upstream fish passage.
		Develop a cooperative approach to ensure unimpeded upstream passage of adult spring-run chinook salmon and steelhead in Mill Creek.	E074804	Cooperatively develop and implement an interim fish-passage corrective program at Clough Dam on Mill Creek until a permanent solution is cooperatively developed with the landowners.
		Develop a cooperative program to improve the upstream passage of adult spring-run chinook salmon and steelhead in Butte Creek to allow access to 100% of the habitat below the Centerville Head Dam.	E074805	Improve the survival and passage of chinook salmon and steelhead in Butte Creek by cooperatively developing and evaluating operational criteria and potential modifications to the Butte Slough outfall.
			E074806	Increase the survival of chinook salmon in Butte Creek by cooperatively helping local interests eliminate stranding at the drainage outfalls in the lower reach.
	Feather River/Sutter Basin	Improve water quality conditions in the Feather, Yuba, and Bear Rivers to benefit anadromous fish.	E080501	Develop a cooperative program to identify and remove physical and water quality barriers in the Feather River that impede access for white and green sturgeon to spawning habitat, or facilitate passage around these barriers.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement.	Feather River/Sutter Basin	Increase adult and juvenile anadromous fish passage in the Yuba River by providing access to 100% of the available habitat below Englebright Dam.	E084801	Develop a cooperative program to improve survival of anadromous fish in the Yuba River by removing dams or constructing fish ladders, providing passage flows, keeping channels open, eliminating predator habitat at instream structures, and constructing improved fish bypasses at diversions.
			E084802	Facilitate passage of spawning adult salmonids in the Yuba River by maintaining appropriate flows through the fish ladders or modifying the fish ladders at diversion dams.
	Yolo Basin	Improve survival of chinook salmon and steelhead in the Bear River by providing access to 100% of the habitat available below the South Sutter Irrigation District (SSID) diversion dam.	E084803	Improve survival and passage of chinook salmon and steelhead in the Bear River by negotiating with landowners to remove or modify culvert crossings on the Bear River.
		Prevent adult salmon and steelhead stranding during their upstream migrations.	E104701	Develop a cooperative program to construct a weir or screen at the lower end of the Knights Landing Ridge Cut Canal to keep adult salmon and steelhead from migrating upstream into the Colusa Basin drain.
E24. Reduction in levels of predation on juvenile anadromous fish.	Sacramento River	Reduce the adverse effects of predatory fish by identifying and eliminating humanmade instream structures or operational conditions that allow unnatural rates of predation.	E035601	Selectively evaluate areas and make physical changes to structures in the Sacramento River, such as bridge abutments, diversion dams, and water intakes, that currently may attract predators and provide them with additional advantages in preying on juvenile salmon and steelhead. Pilot studies and evaluations are needed to determine the types of changes required and the potential degree of implementation.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E24. Reduction in levels of predation on juvenile anadromous fish.	Feather River/Sutter Basin	Increase the survival of adult and juvenile anadromous fish in the Yuba River by providing access to 100% of the habitat available below Englebright Dam.	E084801	Develop a cooperative program to improve survival of anadromous fish in the Yuba River by removing dams or constructing fish ladders, providing passage flows, keeping channels open, eliminating predator habitat at instream structures, and constructing improved fish bypasses at diversions.
E25. Reduction in the adverse effects of harvest on fish and wildlife populations.	Sacramento River	Reduce illegal harvest of fish species to a minimum to maintain or increase populations by increasing enforcement efforts by 50% to 100%.	E035801	Increase enforcement efforts.
		Manage the legal harvest of chinook salmon, steelhead, and sturgeon by shifting harvest from natural stocks to hatchery-reared stocks where possible, or by reducing harvest of wild stocks until the naturally produced populations recover.	E035802	Develop a cooperative program to mark all hatchery salmon and steelhead, allowing selective harvest of hatchery fish while limiting harvest of wild fish. This action should be implemented on a short-term and experimental basis to ensure that it meets its objective and is cost effective.
			E035803	Encourage regulatory agencies to change fishing regulations (i.e., by restricting seasons, limits, and gear and reducing harvest of wild fish) to further reduce legal harvest and any ancillary effects of fishing gear or techniques. Restrictions should be severe in the short term. Long-term restrictions would depend on response of populations and effectiveness of restrictions and the degree of effectiveness of the action.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E25. Reduction in the adverse effects of harvest on fish and wildlife populations.	North Sacramento Valley	Develop harvest management strategies that allow wild, naturally produced fish spawning populations to attain levels that fully use existing and restored habitat, and focus harvest on hatchery-produced fish.	E045801	Control illegal harvest by providing increased enforcement efforts.
			E045802	Develop harvest management plans with commercial and recreational fishery organizations, resource management agencies, and other stakeholders to meet the target.
			E045803	Reduce the harvest of wild, naturally produced steelhead populations where necessary by marking hatchery-reared fish and instituting a selective fishery.
	Butte Basin	Develop harvest management strategies that allow wild, naturally produced fish spawning populations to attain levels that fully use existing and restored habitat, and focus harvest on hatchery-produced fish.	E075801	Control illegal harvest by enforcement efforts.
			E075802	Develop harvest management plans with commercial and recreational fishery organizations, resource management agencies, and other stakeholders to meet the target.
			E075803	Reduce the harvest of wild, naturally produced steelhead populations where necessary by marking hatchery-reared fish and instituting a selective fishery.
	Feather River/Sutter Basin	Develop harvest management strategies that allow wild, naturally produced fish spawning populations to attain levels that make full use of existing and restored habitat, and focus harvest on hatchery-produced fish.	E085801	Control illegal harvest by increasing enforcement efforts.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E25. Reduction in the adverse effects of harvest on fish and wildlife populations.	Feather River/Sutter Basin	Develop harvest management strategies that allow wild, naturally produced fish spawning populations to attain levels that make full use of existing and restored habitat, and focus harvest on hatchery-produced fish.	E085802	Develop harvest management plans with commercial and recreational fishery organizations, resource management agencies, and other stakeholders to meet target levels.
			E085803	Reduce harvest of wild, naturally produced steelhead populations where necessary by marking hatchery-reared fish and instituting selective harvesting.
	American River Basin	Develop harvest management strategies for Central Valley chinook salmon and steelhead populations that allow populations of naturally spawning fish to attain levels that fully use existing and restored habitat.	E095801	Control illegal harvest of chinook salmon and steelhead by increasing enforcement efforts.
			E095802	Develop harvest management plans for chinook salmon and steelhead with commercial and recreational fishery organizations, resource management agencies, and other stakeholders to meet target escapement and production goals for lower American River and American River Basin creeks.
E26. Improved management of fish hatcheries to better maintain the genetic integrity of wild stocks of anadromous fishes.	Sacramento River	Limit hatchery stocking to populations that cannot be sustained through natural production.	E035901	Augment winter-run, spring-run, and late-fall-run chinook salmon and steelhead with hatchery-produced smolts during the short-term rebuilding phase of restoration efforts, and only when alternative measures are deemed insufficient to provide recovery of the populations. Stocking of hatchery-reared fish will be undertaken as experiments and will be adjusted or terminated as necessary depending on results.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E26. Improved management of fish hatcheries to better maintain the genetic integrity of wild stocks of anadromous fishes.	Sacramento River	Employ methods to limit straying and loss of genetic integrity of wild and hatchery supported stocks.	E035902	Rear salmon and steelhead in hatcheries on natal streams to limit straying. If hatchery augmentation of Sacramento River populations of salmon and steelhead is necessary, then hatcheries should be built on the Sacramento River for that purpose.
			E035903	Limit stocking of salmon and steelhead fry and smolts to natal watersheds to minimize straying that may compromise the genetic integrity of naturally producing populations.
		Minimize further threats that hatchery fish will contaminate wild stocks of salmon and steelhead.	E035904	Where hatchery production is underway and continues, methods should be adopted and improved to select an appropriate cross-section of the adult population for spawning at the hatchery.
			E035905	Select spawning adults of appropriate genetic makeup to minimize genetic contamination of existing naturally produced and hatchery stocks of salmon and steelhead. Given the present difficulty of determining genetic makeup of spawning adults selected for hatcheries, this action will necessarily be experimental. Hatchery-reared adults may be preferentially selected or not selected if they are adequately marked or tagged, or have other identifiable features. Other methods may be developed to genetically categorize naturally produced or hatchery fish.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E26. Improved management of fish hatcheries to better maintain the genetic integrity of wild stocks of anadromous fishes.	North Sacramento Valley	Limit hatchery stocking if populations of salmon or steelhead can be sustained by natural production.	E045901	Augment populations of fall chinook salmon and steelhead only when alternative measures are deemed insufficient to provide recovery of the populations.
		Minimize further threats that hatchery fish will contaminate naturally produced stocks of chinook salmon and steelhead.	E045902	Adopt methods for selecting adult spawners for the hatchery from an appropriate cross-section of the adult population available to the hatchery.
	Butte Basin	Limit hatchery stocking if populations of salmon or steelhead can be sustained by natural production.	E075901	Augment populations of fall chinook salmon and steelhead only when alternative measures are deemed insufficient to provide recovery of the populations.
		Minimize further threats that hatchery fish will contaminate naturally produced stocks of chinook salmon and steelhead.	E075902	Adopt methods for selecting adult spawners for the hatchery from an appropriate cross-section of the adult population available to the hatchery.
	Feather River/Sutter Basin	Limit hatchery stocking if populations of salmon or steelhead can be sustained by natural production.	E085902	Augment populations of fall-run chinook salmon and steelhead only when alternative measures are deemed insufficient to provide recovery of the populations.
		Minimize further threats that hatchery-produced fish will interbreed with wild stocks of chinook salmon and steelhead.	E085903	Adopt methods for selecting adult spawners for the hatchery from an appropriate cross-section of the adult population available to the hatchery.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E26. Improved management of fish hatcheries to better maintain the genetic integrity of wild stocks of anadromous fishes.	American River Basin	Limit hatchery stocking if populations of salmon or steelhead can be sustained by natural production.	E095901	Augment populations of fall-run chinook salmon and steelhead only when alternative measures are insufficient to permit recovery of the populations.
		Minimize further threats that hatchery-reared fish will contaminate wild stocks of chinook salmon and steelhead.	E095902	Adopt methods for selecting adult spawners adults for the hatchery from an appropriate cross-section of the adult population available to the hatchery.
			E095903	Develop a collaborative program to coded-wire tag a representative proportion of all Nimbus Hatchery fall-run chinook salmon.
E27b. Reduction in the concentrations and loadings of contaminants in the aquatic environment.	Sacramento River	Reduce losses of fish and wildlife resulting from pesticides, hydrocarbons, heavy metals, and other pollutants in the Sacramento River.	E035702	Develop a cooperative program to remedy heavy-metal pollution from Iron Mountain Mine (IMM) to meet basin plan standards and implement reliable and proven remedies that ensure continued treatment and control of heavy-metal waste before water is discharged to the Sacramento River.
			E035703	Develop a cooperative program to eliminate scouring of toxic metal-laden sediments in the Spring Creek and Keswick Reservoirs.
		Reduce losses of fish and wildlife resulting from pesticides, hydrocarbons, heavy metals, and other pollutants in the Sacramento River.	E035704	Control contaminant input to the Sacramento River system by constructing and operating stormwater treatment facilities and implementing industrial best management practices (BMPs) for stormwater and erosion control.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E27b. Reduction in the concentrations and loadings of contaminants in the aquatic environment.	American River Basin	Reduce the application on agricultural lands of herbicides, pesticides, fumigants, and other agents toxic to fish and wildlife that have the greatest risk to fish and wildlife populations.	E095701	Enter into conservation easements with willing landowners to modify agricultural practices in ways to reduce loads and concentrations of contaminants.
			E095702	Provide incentives to landowners to modify agricultural or other land use practices that contribute to the input of contaminants into waterways.
	Yolo Basin	Restore and maintain water quality in the Cache Creek watershed.	E105701	Identify the sources and reduce the amounts of mercury and other contaminants coming into the watershed from upstream sources.
		Restore and maintain water quality in the Putah Creek watershed.	E105702	Develop and implement a Streamkeeper program on Putah Creek.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions				
Q1. Reduction of oxygen-depleting substances in the aquatic environment.	American River Basin	Reduce sediment loads that cause low intersubstrate dissolved oxygen concentrations that affect salmon spawning and rearing habitat and establish full salmon spawning and rearing activity.	Q090101	Possible management actions include gravel enhancement programs, channel restoration programs, development of river-corridor assessments and management strategies, and regulation of high-water temperature reservoir releases.
Q2. Maintain pathogen loadings or below maximum allowed levels and reduce levels of total organic carbon (TOC), bromide, and total dissolved solids (TDS) to increase the availability of water for beneficial uses.	American River Basin	Decrease levels of nutrients, pathogens, nonseawater TDS, and TOC in drinking water supplies.	Q090201	Control algal blooms in upstream reservoirs and aquatic weed growth in the lower American River.
Q3. Reduction of mercury loadings in water and sediment.	American River Basin	Reduce mercury in water and sediment to levels that do not adversely affect aquatic organisms, wildlife, and human health.	Q090301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation, or bioavailability for different sections of the watershed. Select and implement a remediation project(s) with a short-term time frame for expected results.
			Q090302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time-frames.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q4. Reduction of pesticide loadings in the aquatic environment.	American River Basin	Reduce concentrations of pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q090501	<p>Support conservation efforts to help achieve the Water Quality Program objectives. Develop and implement BMPs. On-farm conservation practices could include installation or implementation of the following features:</p> <ul style="list-style-type: none"> • tailwater ditch tarps, • land leveling, • cutback stream, • surge irrigation, • sprinkler germination, • drip irrigation, • shortened length of run, • gated surface pipe, • vegetated filter strip, • cover crop, • grassed waterway, • conservation tillage, • sediment basin, • tailwater return system, • irrigation management, • nutrient management, • integrated pest management, and • tailwater management.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q7. Reduction of cadmium, copper, and zinc loadings to levels that do not adversely effect Bay-Delta species or beneficial uses of water.	American River Basin	Reduce metal loading of the Bay-Delta and its tributaries to levels that do not adversely affect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q090801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
			Q090802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.
Q3. Reduction of mercury loadings in water and sediment.	Butte Basin	Reduce mercury in water and sediment to levels that do not adversely affect aquatic organisms, wildlife, and human health.	Q070301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation or bioavailability for different sections of the watershed. Select and implement a remediation project(s) with a short-term time frame for expected results.
			Q070302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time frames.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q4. Reduction of pesticide loadings in the aquatic environment.	Butte Basin	Reduce concentrations of pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q070501	<p>Support conservation efforts to help achieve the Water Quality Program objectives. Develop and implement BMPs. On-farm conservation practices could include installation or implementation of the following features:</p> <ul style="list-style-type: none"> • tailwater ditch tarps, • land leveling, • cutback stream, • surge irrigation, • sprinkler germination, • drip irrigation, • shortened length of run, • gated surface pipe, • vegetated filter strip, • cover crop, • grassed waterway, • conservation tillage, • sediment basin, • tailwater return system, • irrigation management, • nutrient management, • integrated pest management, and • tailwater management.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q7. Reduction of cadmium, copper, and zinc loadings to levels that do not adversely affect Bay-Delta species or beneficial uses of water.	Butte Basin	Reduce metal loading of the Bay-Delta and its tributaries to levels that do not adversely affect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q070801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
			Q070802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.
Q3. Reduction of mercury loadings in water and sediment.	Colusa Basin	Reduce mercury in water and sediment to levels that do not adversely affect aquatic organisms, wildlife and human health.	Q060301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation or bioavailability for different sections of the watershed. Select and implement a remediation project or projects with a short-term time frame for expected results.
			Q060302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time frames.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q4. Reduction of pesticide loadings in the aquatic environment.	Colusa Basin	Reduce concentrations of pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q060501	<p>Support conservation efforts to help achieve the Water Quality Program objectives. Develop and implement BMPs. On-farm conservation practices could include installation or implementation of the following features:</p> <ul style="list-style-type: none"> • tailwater ditch tarps, • land leveling, • cutback stream, • surge irrigation, • sprinkler germination, • drip irrigation, • shortened length of run, • gated surface pipe, • vegetated filter strip, • cover crop, • grassed waterway, • conservation tillage, • sediment basin, • tailwater return system, • irrigation management, • nutrient management, • integrated pest management, and • tailwater management.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q7. Reduction of cadmium, copper, and zinc loadings to levels that do not adversely affect Bay-Delta species or beneficial uses of water.	Colusa Basin	Reduce metal loading of the Bay-Delta and its tributaries to levels that do not adversely affect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q060801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
			Q060802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q4. Reduction of pesticide loadings in the aquatic environment.	Cottonwood Creek	Reduce concentrations of pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q050501	<p>Support conservation efforts to help achieve the Water Quality Program objectives. Develop and implement BMPs. On-farm conservation practices could include installation or implementation of the following features:</p> <ul style="list-style-type: none"> • tailwater ditch tarps, • land leveling, • cutback stream, • surge irrigation, • sprinkler germination, • drip irrigation, • shortened length of run, • gated surface pipe, • vegetated filter strip, • cover crop, • grassed waterway, • conservation tillage, • sediment basin, • tailwater return system, • irrigation management, • nutrient management, • integrated pest management, and • tailwater management.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q7. Reduction of cadmium, copper, and zinc loadings to levels that do not adversely affect Bay-Delta species or beneficial uses of water.	Cottonwood Creek	Reduce metal loading of the Bay-Delta and its tributaries to levels that do not adversely affect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q050801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
Q3. Reduction of mercury loadings in water and sediment.	Feather River/Sutter Basin	Reduce mercury in water and sediment to levels that do not adversely affect aquatic organisms, wildlife, and human health.	Q080301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation, or bioavailability for different sections of the watershed. Select and implement a remediation project or projects with a short-term time frame for expected results.
			Q080302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time frames.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q4. Reduction of pesticide loadings in the aquatic environment.	Feather River/Sutter Basin	Reduce concentrations of pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q080501	<p>Support conservation efforts to help achieve the Water Quality Program objectives. Develop and implement BMPs. On-farm conservation practices could include installation or implementation of the following features:</p> <ul style="list-style-type: none"> • tailwater ditch tarps, • land leveling, • cutback stream, • surge irrigation, • sprinkler germination, • drip irrigation, • shortened length of run, • gated surface pipe, • vegetated filter strip, • cover crop, • grassed waterway, • conservation tillage, • sediment basin, • tailwater return system, • irrigation management, • nutrient management, • integrated pest management, and • tailwater management.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q7. Reduction of cadmium, copper, and zinc loadings to levels that do not adversely affect Bay-Delta species or beneficial uses of water.	Feather River/Sutter Basin	Reduce metal loading of the Bay-Delta and its tributaries to levels that do not adversely affect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q080801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
			Q080802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.
Q2. Maintain pathogen loadings or below maximum allowed levels and reduce levels of TOC, bromide, and TDS to increase the availability of water for beneficial uses.	North Sacramento Valley	Decrease levels of nutrients, pesticides, pathogens, nonseawater TDS, and TOC in drinking water supplies.	Q040201	Reduce impacts from livestock grazing along the Sacramento River by use of BMPs.
Q3. Reduction of mercury loadings in water and sediment.	North Sacramento Valley	Reduce mercury in water and sediment to levels that do not adversely affect aquatic organisms, wildlife, and human health.	Q040301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation, or bioavailability for different sections of the watershed. Select and implement a remediation project or projects with a short-term time frame for expected results.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q3. Reduction of mercury loadings in water and sediment.	North Sacramento Valley	Reduce mercury in water and sediment to levels that do not adversely affect aquatic organisms, wildlife, and human health. mercury loadings in water and sediment.	Q040302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time frames.
Q4. Reduction of pesticide loadings in the aquatic environment.	North Sacramento Valley	Reduce concentrations of pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q040501	Support conservation efforts to help achieve the Water Quality Program objectives. Develop and implement BMPs. On-farm conservation practices could include installation or implementation of the following features: <ul style="list-style-type: none"> • tailwater ditch tarps, • land leveling, • cutback stream, • surge irrigation, • sprinkler germination, • drip irrigation, • shortened length of run, • gated surface pipe, • vegetated filter strip, • cover crop, • grassed waterway, • conservation tillage, • sediment basin, • tailwater return system, • irrigation management, • nutrient management, • integrated pest management, and • tailwater management.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q7. Reduction of cadmium, copper, and zinc loadings to levels that do not adversely affect Bay-Delta species or beneficial uses of water.	North Sacramento Valley	Reduce metal loading of the Bay Delta and its tributaries to levels that do not adversely affect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q040801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
			Q040802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.
Q2. Maintain pathogen loadings or below maximum allowed levels and reduce levels of TOC, bromide, and TDS to increase the availability of water for beneficial uses.	Sacramento River	Decrease levels of nutrients, pathogens, nonseawater TDS, and TOC in drinking water supplies.	Q030201	Reduce impacts from livestock grazing along the Sacramento River by use of BMPs.
Q3. Reduction of mercury loadings in water and sediment.	Sacramento River	Reduce mercury in water and sediment to levels that do not adversely affect aquatic organisms, wildlife, and human health.	Q030301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation, or bioavailability for different sections of the watershed. Select and implement a remediation project or projects with a short-term time frame for expected results.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q3. Reduction of mercury loadings in water and sediment.	Sacramento River	Reduce mercury in water and sediment to levels that do not adversely affect aquatic organisms, wildlife, and human health.	Q030302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time frames.
Q4. Reduction of pesticide loadings in the aquatic environment.	Sacramento River	Reduce concentrations of pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q030501	Support conservation efforts to help achieve the Water Quality Program objectives. Develop and implement BMPs. On-farm conservation practices could include installation or implementation of the following features: <ul style="list-style-type: none"> • tailwater ditch tarps, • land leveling, • cutback stream, • surge irrigation, • sprinkler germination, • drip irrigation, • shortened length of run, • gated surface pipe, • vegetated filter strip, • cover crop, • grassed waterway, • conservation tillage, • sediment basin, • tailwater return system, • irrigation management, • nutrient management, • integrated pest management, and • tailwater management.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q7. Reduction of cadmium, copper, and zinc loadings to levels that do not adversely affect Bay-Delta species or beneficial uses of water.	Sacramento River	Reduce metal loading of the Bay-Delta and its tributaries to levels that do not adversely affect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q030801	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.
Q3. Reduction of mercury loadings in water and sediment.	Yolo Basin	Reduce mercury in water and sediment to levels that do not adversely affect aquatic organisms, wildlife, and human health.	Q100301	Develop a variety of mercury remediation options and projects based on changing mercury loading, transport, transformation, or bioavailability for different sections of the watershed. Select and implement a remediation project(s) with a short-term time frame for expected results.
			Q100302	Select and implement new mercury remediation projects whose expected results have either intermediate- or long-term time frames.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q4. Reduction of pesticide loadings in the aquatic environment.	Yolo Basin	Reduce concentrations of pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q100501	<p>Support conservation efforts to help achieve the Water Quality Program objectives. Develop and implement BMPs. On-farm conservation practices could include installation or implementation of the following features:</p> <ul style="list-style-type: none"> • tailwater ditch tarps, • land leveling, • cutback stream, • surge irrigation, • sprinkler germination, • drip irrigation, • shortened length of run, • gated surface pipe, • vegetated filter strip, • cover crop, • grassed waterway, • conservation tillage, • sediment basin, • tailwater return system, • irrigation management, • nutrient management, • integrated pest management, and • tailwater management.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Proposed Water Quality Program Actions (continued)				
Q7. Reduction of cadmium, copper, and zinc loadings to levels that do not adversely affect Bay-Delta species or beneficial uses of water.	Yolo Basin	Reduce metal loading of the Bay-Delta and its tributaries to levels that do not adversely affect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q100801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
			Q100802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.
Water Use Efficiency Program				
W1. Support implementation of water management techniques that increase the effectiveness of water use management and efficiency for agricultural uses.	All zones	Support implementation of water management techniques that increase the effectiveness of water use management and efficiency for agricultural uses.	None	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Water Use Efficiency Program (continued)				
W2. Support implementation of measures that increase agricultural production per unit of water used, protect water quality, or increase environmental benefits while meeting agricultural needs.	All zones.	Support implementation of measures that increase agricultural production per unit of water used, protect water quality, or increase environmental benefits while meeting agricultural needs.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
W3. Provide urban water agencies with planning and technical assistance, financing assistance, and assurances for development and implementation of water management plans and BMPs.	All zones.	Provide urban water agencies with planning and technical assistance, financing assistance, and assurances for development and implementation of water management plans and BMPs.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
W4. Support development and implementation of water recycling projects.	All zones.	Support development and implementation of water recycling projects.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Water Transfer Program				
T1. Implement a framework of actions, policies, and processes that will facilitate transfers and the further development of a statewide water transfer market.	All zones.	Implement a framework of actions, policies, and processes that will facilitate transfers and the further development of a statewide water transfer market.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
Watershed Management Program				
M1. Fund and implement watershed restoration, maintenance, conservation, and monitoring activities.	All zones.	Fund and implement watershed restoration, maintenance, conservation, and monitoring activities.	None.	Specific program actions have not yet been identified. The focus of the program is primarily in the upper watersheds of the Bay-Delta and, therefore, outside of the geographic scope of the MSCS. The potential impacts of implementing the program have been analyzed in the Programmatic EIS/EIR.
Storage Facilities Program				
S1. Construct and operate enlarged or new surface water storage facilities.	North Sacramento Valley and watershed lands adjacent to the Colusa Basin and Cottonwood Creek Zones	Construct and operate enlarged or new surface water storage facilities.	None.	Construct and operate new or enlarge existing surface water storage reservoirs.

Table B-3. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Storage Facilities Program (continued)				
S2. Construct and operate new groundwater storage facilities.	Butte Basin, Colusa Basin, Feather River/Sutter Basin, American River Basin, and Yolo Basin Zones.	Construct and operate new groundwater storage facilities.	None.	Construct and operate new groundwater storage facilities.
Conveyance and Storage Operations				
01. Implement operating criteria needed to improve water management for beneficial uses.	All zones.	Implement operating criteria needed to improve water management for beneficial uses.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
02. Implement a Water Management Strategy to provide operational flexibility to achieve environmental benefits.	All zones.	Implement a Water Management Strategy to provide operational flexibility to achieve environmental benefits.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.

Table B-3. Continued

Notes:

Targets and actions are derived from the February 1999 revision of CALFED plans.

Acronyms:

ACID	Anderson-Cottonwood Irrigation District
BMP	best management practice
cfs	cubic feet per second
CVP	Central Valley Project
DFG	California Department of Fish and Game
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
ERP	Ecosystem Restoration Program
IMM	Iron Mountain Mine
MSCS	Multi-Species Conservation Strategy
msl	mean sea level
NCC	Natomas Cross Channel
NEMDC	Natomas East Main Drainage Canal
NMFS	National Marine Fisheries Service
OC	organic carbon
PG&E	Pacific Gas and Electric Company
SRA	shaded riverine aquatic
SSID	South Sutter Irrigation District
TOC	total organic carbon
TDS	total dissolved solids
USACE	U.S. Army Corps of Engineers

Citations:

California Department of Fish and Game. 1993. Restoring Central Valley streams: a plan for action. November 1993. Sacramento, CA.

Table B-4. San Joaquin River Region: Proposed CALFED Actions Evaluated in the Multi-Species Conservation Strategy

Multi-Species Conservation Strategy (MSCS) User Guide: This table presents a summary of the Preferred Alternative and Common Program targets and actions identified in the Programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the San Joaquin River Region that are evaluated and covered under the MSCS. A description of the types of CALFED targets and actions not covered under the MSCS is presented in Chapter 4, Section 4.1.1. As described in Chapter 4, Section 4.1.1, the MSCS analyzes the Summary Programmatic Action Outcomes (summary outcomes), which embody all of the targets and actions listed for each summary outcome (shown in the third and fifth table columns, respectively). Table 4-1 summarizes the summary outcomes analyzed in the MSCS by CALFED region. Each summary outcome is assigned a unique code (e.g., E1). The second column identifies the Ecosystem Restoration Program (ERP) ecological management zone in which targets and actions could be implemented. A unique action code has been assigned to each action and is shown in the fourth column.

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Ecosystem Restoration Program				
E1. Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Eastside Delta Tributaries	For the Cosumnes River, where a natural streamflow pattern presently exists with natural winter and spring streamflows, maintain or restore summer and fall base flows.	E110101	Improve summer and fall base flows on the Cosumnes River by developing new water supplies along the river and by purchases from willing sellers.
			E110102	Cooperatively develop a program to minimize or eliminate unpermitted water diversions on the Cosumnes River, and review water allocation for the entire basin.
			E110103	Cooperatively develop a groundwater replenishment program to raise the water table in the Cosumnes River floodplain.
		For the Mokelumne River, provide conditions to maintain the fishery and riparian resources in good condition by implementing and evaluating the flow regime in the Principles of Agreement (POA) for the Mokelumne River. The POA provide increased flows below Camanche Dam beyond present requirements, which will benefit the fishery and riparian resources of the lower Mokelumne River.	E110104	Provide target flows for the Mokelumne Rivers from storage releases, but only if there are sufficient inflows into storage reservoirs and carryover storage to meet target levels. The additional water would be obtained from developing new water supplies within the Central Valley basin, as well as from water transfers and willing sellers of water.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Eastside Delta Tributaries	For the Mokelumne River, provide conditions to maintain the fishery and riparian resources in good condition by implementing and evaluating the flow regime in the Principles of Agreement (POA) for the Mokelumne River. The POA provide increased flows below Camanche Dam beyond present requirements, which will benefit the fishery and riparian resources of the lower Mokelumne River.	E110105	Maintain or enhance summer and fall base flows on the Mokelumne River by developing new water supplies along the river and by purchases from willing sellers.
		Provide enhanced streamflows below Woodbridge Dam by providing minimum flows recommended by DFG in dry years:	E110106	Cooperatively evaluate the potential for minimizing water supply impacts by replacing the diversions at Woodbridge with other Delta diversions.
		<ul style="list-style-type: none"> • 200 cubic feet per second (cfs), November 1–April 14; • 250 cfs, April 15–April 30; • 300 cfs, May; and • 20 cfs, June 1–October 31. 		
		In normal years, minimum flows should be:	E110107	Cooperatively develop a program to minimize or eliminate unpermitted water diversions on the Mokelumne.
		<ul style="list-style-type: none"> • 250 cfs, October 1–October 14; • 300 cfs, October 15–February 29; • 350 cfs, March; • 400 cfs, April; • 450 cfs, May; • 400 cfs, June; • 150 cfs, July; and • 100 cfs, August–September. 		
		In wet years, minimum flows should be:		
		<ul style="list-style-type: none"> • 300 cfs, June 1–October 14; • 350 cfs, October 15–February 29; • 400 cfs, March; and • 450 cfs, April–May. 		

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural river flows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	Eastside Delta Tributaries	For the Calaveras River, where the natural streamflow has been greatly altered, streamflows should be enhanced below New Hogan Dam by the minimum flows recommended by the California Department of Fish and Game (DFG).	E110108	Provide target flows for the Calaveras River from storage releases, but only if there are sufficient inflows into storage reservoirs and carryover storage to meet target levels. The additional water would be obtained from developing new water supplies within the Central Valley basin, as well as from water transfers and willing sellers of water.
			E110109	Cooperatively develop a program to minimize or eliminate unpermitted water diversions on the Calaveras River.
			E110110	A flow event should be provided in late February or early March, averaging 100–200 cfs in dry years, 300–400 cfs in normal years, and 600–800 cfs in wet years. Such flows would be provided only when inflows to New Hogan Reservoir are at these levels.
		Restore the gravel transport and cleaning process to attain sufficient high-quality salmon spawning habitat in each of the three streams for target population levels.	E110205	Develop a cooperative program to provide late-winter or early-spring flow events as needed, to establish appropriate flushing/channel maintenance flows.
		Maintain mean daily water temperatures at or below levels suitable for maintenance of all life stages of fall-run chinook salmon and steelhead resources.	E110502	Establish minimum pool size at New Hogan Reservoir to ensure cold-water releases into the Calaveras River.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	San Joaquin River	Manage flow releases from tributary streams to provide adequate upstream and downstream passage of fall-run and late-fall-run chinook salmon, rainbow trout, and steelhead and spawning and rearing habitat for American shad, splittail, and sturgeon from the Merced River confluence to Vernalis.	E120101	Develop a cooperative program to purchase water from willing sellers or develop alternative sources of water.
		<p>Maintain the following base flows in the Tuolumne River below Don Pedro Dam:</p> <ul style="list-style-type: none"> • in critical and below years, flow releases should be: <ul style="list-style-type: none"> – 50 cfs, June–September; – 100 cfs, October 1–15; and – 150 cfs, October 16–May 31, plus an 11,091-acre-foot (af) outmigration pulse flow; • in median critical dry years, flow releases should be: <ul style="list-style-type: none"> – 50 cfs, June–September; – 100 cfs, October 1–15; and – 150 cfs, October 16–May 31, plus a 20,091-af outmigration pulse flow; <p>(Continued on next page)</p>	E130103	Develop a cooperative approach to coordinate flow releases to attain target levels.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	San Joaquin River	<p>(Continued)</p> <ul style="list-style-type: none"> • in intermediate critical dry years, flow releases should be: <ul style="list-style-type: none"> – 50 cfs, June–September; – 150 cfs, October 1–15; and – 150 cfs, October 16–May 31, plus a 32,619-af outmigration pulse flow; • in median dry years, flow releases should be: <ul style="list-style-type: none"> – 75 cfs, June–September; – 150 cfs, October 1–15; and – 150 cfs, October 16–May 31, plus a 37,060-af outmigration pulse flow; • in intermediate dry below-normal years, flow releases should be: <ul style="list-style-type: none"> – 75 cfs, June–September; – 180 cfs, October 1–15; and – 180 cfs, October 16–May 31, plus a 35,920-af outmigration pulse flow; • in median-below-normal years, flow releases should be: <ul style="list-style-type: none"> – 75 cfs, June–September; – 200 cfs, October 1–15; and – 175 cfs, October 16–May 31, plus a 60,027-af outmigration pulse flow and a 1,736-af attraction pulse flow; and <p>(Continued on next page)</p>	E130103	Develop a cooperative approach to coordinate flow releases to attain target levels.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	San Joaquin River	(Continued) <ul style="list-style-type: none"> • in all other year types, flow releases should be: <ul style="list-style-type: none"> – 250 cfs, June–September; – 300 cfs, October 1–15; and – 300 cfs, October 16–May 31, plus a 89,882-af outmigration pulse flow and a 5,950-af attraction pulse flow. 	E130103	Develop a cooperative approach to coordinate flow releases to attain target levels.
	East San Joaquin Basin	Maintain the following base flows in the Stanislaus River below Goodwin Dam: <ul style="list-style-type: none"> • in critical, dry, and below-normal years, minimum flows should be 200–300 cfs except for a flow event of 1,500 cfs for 30 days in April and May; • in above-normal years, minimum flows should be 300–350 cfs except for 800 cfs in June and 1,500 cfs in April and May; and • in wet years, minimum flows should be 300–400 cfs except for 1,500 cfs from April through June. 	E130101	Develop a cooperative approach to coordinate flow releases to attain target levels.
		Provide the following 10-day spring flow events on the Stanislaus River: 2,500–3,000 cfs in late April or early May in normal years; 3,000–4,000 cfs in wet years. Such flows would be provided only when inflows to New Melones Reservoir are at these levels.	E130102	Develop a cooperative approach to coordinate flow releases to attain target levels.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	East San Joaquin Basin	Maintain the following base flows in the Merced River below Lake McClure: <ul style="list-style-type: none"> • in dry years, minimum instream flows at Shaffer Bridge should be: <ul style="list-style-type: none"> – 15 cfs, June–October 15; – 60 cfs, October 16–October 31 and January–May; and – 75 cfs, November–December; and • in normal years, minimum instream flows at Shaffer Bridge should be: <ul style="list-style-type: none"> – 25 cfs, June–October 15; – 75 cfs, October 16–October 31 and January–May; and – 100 cfs, November–December. 	E130104	Develop a cooperative approach to coordinate flow releases to attain target levels.
	East San Joaquin Basin	Provide the following 10-day spring flow events on the Merced River: 1,000–1,500 cfs in late April or early May in dry years; 2,000–2,500 cfs in normal years; and 3,000–4,000 cfs in wet years. Such flows would be provided only when inflows to Lake McClure are at these levels.	E130105	Develop a cooperative approach to coordinate flow releases to attain target levels.
	West San Joaquin Basin	Provide flows of suitable-quality water that more closely emulate natural annual and seasonal streamflow patterns in West San Joaquin tributary watersheds. Provide a total watershed flow of 250–500 cfs to the San Joaquin River in dry and normal years for a 10-day period in Late April to early May (approximately 5000–10,000 af).	E140101 E140102	Enter into agreements with water districts and wetland managers to provide return flows of high-quality water from irrigated agriculture and seasonal wetlands to the San Joaquin River. Enter into agreements with landowners and water districts to limit diversions of natural flows from streams to improve streamflows.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E1. Provide for more natural riverflows and Bay-Delta freshwater inflow peaks in fall, winter, and spring of all but critical years.	West San Joaquin Basin	Provide flows of suitable-quality water that more closely emulate natural annual and seasonal streamflow patterns in West San Joaquin tributary watersheds. Provide a total watershed flow of 250–500 cfs to the San Joaquin River in dry and normal years for a 10-day period in Late April to early May (approximately 5000–10,000 af).	E140103	Make seasonal releases from the California Aqueduct or Delta Mendota Canal into streams and wetlands.
			E140104	Limit capture of natural streamflows from westside tributaries into irrigation canals and ditches, and State and federal aqueducts.
E2. Improvement in the supply of sediment to rivers and streams necessary to provide spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Eastside Delta Tributaries	On the Mokelumne River below Camanche Dam, provide for the annual supplementation of 1,200–2,500 cubic yards of gravel into the active stream channel to maintain quality spawning areas and to replace gravel that is transported downstream.	E110201	Develop a cooperative program to evaluate, implement, and monitor sediment supplementation on the Mokelumne River in a manner consistent with adaptive management.
			E110202	Cooperatively develop a program to protect all existing sources of gravel recruitment to the rivers.
		On the Calaveras River, provide for the annual recruitment of 500–1,000 cubic yards of gravel into the active stream channel.	E110203	Develop a cooperative program to supplement gravel with artificial introductions.
			E110204	Develop a cooperative program with the aggregate resource industry to improve extraction activities within the Mokelumne River floodplain.
			E110205	Develop a cooperative program to provide late-winter or early-spring flow events as needed, to establish appropriate flushing/channel maintenance flows.
		Restore the gravel transport and cleaning process to attain sufficient high quality salmon spawning habitat in each of the three streams for target population levels.		

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary to provide spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	Eastside Delta Tributaries	Restore the gravel transport and cleaning process to attain sufficient high quality salmon spawning habitat in each of the three streams for target population levels.	E110206	Facilitate transport of fine sediments by restoring the river channel configuration as necessary so that it is consistent with planned flow regime and available sediment supply.
			E110207	Develop a cooperative program to improve the flexibility of upstream reservoir management to minimize fine sediment inputs to the lower Mokelumne and Calaveras Rivers.
			E110208	Develop a cooperative evaluation of mechanically cleaning spawning gravel at selected sites in the lower Mokelumne and Calaveras Rivers.
			E110209	Develop a cooperative program on the Cosumnes River to relocate sand and gravel extraction activities to areas beyond the natural stream-meander corridor.
	East San Joaquin Basin	Reduce existing levels of erosion and maintain gravel recruitment in tributaries that sustain an adequate level of gravel recruitment, or restore desirable levels by directly manipulating and augmenting gravel supplies where the natural fluvial process has been interrupted by dams or other features that retain or remove the gravel supply.	E130201	Evaluate the quality of spawning gravel in areas used by chinook salmon in the Stanislaus River. If indicated, renovate or supplement gravel supplies to enhance substrate quality by importing additional gravel as conditions require.
			E130202	Evaluate the quality of spawning gravel in areas used by chinook salmon in the Tuolumne River. If indicated, renovate or supplement gravel supplies to enhance substrate quality.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary to provide spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	East San Joaquin Basin	Reduce existing levels of erosion and maintain gravel recruitment in tributaries that sustain an adequate level of gravel recruitment, or restore desirable levels by directly manipulating and augmenting gravel supplies where the natural fluvial process has been interrupted by dams or other features that retain or remove the gravel supply.	E130203	Evaluate the quality of spawning gravel in areas used by chinook salmon in the Merced River. If indicated, renovate or supplement gravel supplies to enhance substrate quality.
		Preserve and expand the stream-meander belts in the Stanislaus, Tuolumne, and Merced Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E130301	Acquire riparian and meander-zone lands by purchasing them directly or acquiring easements from willing sellers, or provide incentives for voluntary efforts to preserve and manage riparian areas on private lands.
			E130302	Build local support for maintaining active meander zones by establishing a mechanism through which property owners would be reimbursed for lands lost to natural meander processes.
			E130303	Develop a cooperative program to improve opportunities for natural meander by removing riprap and relocating other structures that impair stream meander.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary to provide spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	East San Joaquin Basin	On the Merced River between the towns of Cressey and Snelling, isolate gravel pits, reconfigure dredge tailings, and restore a more natural channel configuration to 5–7 miles of disturbed stream channel. On the Tuolumne River, between river miles (RMs) 25 and 51, isolate 15–30 gravel pits, reconfigure dredge tailings, and restore a more natural stream channel to 6–9 miles of disturbed stream channel. On the Stanislaus River, restore a more natural stream channel to 2.5–5 miles of disturbed stream channel.	E130304	Develop a cooperative program, consistent with flood control requirements, to restore more natural channel configurations to reduce salmonid predator habitat and improve migration corridors.
			E130305	Work with permitting agencies to appropriately condition future gravel-extraction permits. Coordinate the design and implementation of gravel-pit isolation and stream channel configuration with the U.S. Army Corps of Engineers (USACE), local water management agencies, and local governments.
			E130306	Develop a cooperative program with the counties, local agencies, and aggregate resource industry to develop and implement gravel-management programs for each of the three rivers.
			E130307	Develop a cooperative program to implement a salmonid spawning and rearing habitat restoration program, including reconstructing channels at selected sites by isolating or filling in in-channel gravel extraction areas.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E2. Improvement in the supply of sediment to rivers and streams necessary to provide spawning gravels and rehabilitation of related ecological processes (e.g., stream meander) and floodplain habitats (e.g., riparian habitats).	East San Joaquin Basin	Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.	E130402	As needed, restore stream channel and overflow basin configurations within the floodplain.
		Reduce adverse effects of non-native fish species that have a significant effect on juvenile salmon production in the rivers.	E135601	Eliminate gravel pits within or connected to the rivers.
	West San Joaquin Basin	Restore 10–25 miles of stream channel, stream-meander belts, and floodplain processes along westside tributaries of the San Joaquin River.	E140401	Enter into agreements with willing landowners and irrigation districts to set back levees and allow floodplain processes such as stream-meander belts.
			E140403	Reduce or eliminate gravel mining from active stream channels.
E6. Restoration and maintenance of riverine aquatic habitats.	Eastside Delta Tributaries	Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.	E110401	As needed, restore stream channel and overflow basin configurations within the floodplain.
			E110402	Minimize effects of permanent structures, such as bridges and diversion dams, on floodplain processes.
	East San Joaquin Basin	Preserve and expand the stream-meander belts in the Stanislaus, Tuolumne, and Merced Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E130301	Acquire riparian and meander-zone lands by purchasing them directly or acquiring easements from willing sellers, or provide incentives for voluntary efforts to preserve and manage riparian areas on private lands.
			E130302	Build local support for maintaining active meander zones by establishing a mechanism through which property owners would be reimbursed for lands lost to natural meander processes.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E6. Restoration and maintenance of riverine aquatic habitats.	East San Joaquin Basin	Preserve and expand the stream-meander belts in the Stanislaus, Tuolumne, and Merced Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E130303	Develop a cooperative program to improve opportunities for natural meander by removing riprap and relocating other structures that impair stream meander.
		On the Merced River between the towns of Cressey and Snelling, isolate gravel pits, reconfigure dredge tailings, and restore a more natural channel configuration to 5–7 miles of disturbed stream channel. On the Tuolumne River, between river miles (RMs) 25 and 51, isolate 15–30 gravel pits, reconfigure dredge tailings, and restore a more natural stream channel to 6–9 miles of disturbed stream channel. On the Stanislaus River, restore a more natural stream channel to 2.5–5 miles of disturbed stream channel.	E130304	Develop a cooperative program, consistent with flood control requirements, to restore more natural channel configurations to reduce salmonid predator habitat and improve migration corridors.
			E130305	Work with permitting agencies to appropriately condition future gravel-extraction permits. Coordinate the design and implementation of gravel-pit isolation and stream channel configuration with USACE, local water management agencies, and local governments.
			E130306	Develop a cooperative program with the counties, local agencies, and aggregate resource industry to develop and implement gravel management programs for each of the three rivers.
			E130307	Develop a cooperative program to implement a salmonid spawning and rearing habitat restoration program, including reconstructing channels at selected sites by isolating or filling in in-channel gravel extraction areas.
		Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.	E130402	As needed, restore stream channel and overflow basin configurations within the floodplain.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E6. Restoration and maintenance of riverine aquatic habitats.	East San Joaquin Basin	Reduce adverse effects of non-native fish species that have a significant effect on juvenile salmon production in the rivers.	E135601	Eliminate gravel pits within or connected to the rivers.
		Provide conditions for growth of riparian vegetation along sections of rivers in the East San Joaquin Basin Ecological Zone.	E131601	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Stanislaus River.
			E131602	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Tuolumne River.
	West San Joaquin Basin	Restore 10–25 miles of stream channel, stream-meander belts, and floodplain processes along westside tributaries of the San Joaquin River.	E131603	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Merced River.
			E140401	Enter into agreements with willing landowners and irrigation districts to set back levees and allow floodplain processes such as stream-meander belts.
			E140402	Expand existing floodplain overflow basins by obtaining easements of titles from willing sellers of floodplain lands.
			E140403	Reduce or eliminate gravel mining and streambed altering from active stream channels.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E13d. Protection and enhancement of up to 172,800 acres of seasonal wetlands in the San Joaquin River Ecological Management Zone and protection and enhancement of existing seasonal wetlands elsewhere in the San Joaquin River Region.	Eastside Delta Tributaries	Protect existing seasonal wetland habitat through fee acquisition or perpetual easements.	E111501	Develop and implement a cooperative program to improve management of existing, degraded seasonal wetland habitat.
	San Joaquin River	Assist in protecting 52,500 acres of existing seasonal wetland habitat through fee acquisition or perpetual easements consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E121501	Develop and implement a cooperative program to improve management of 52,500 acres of existing, degraded, seasonal wetland habitat.
		Develop and implement a cooperative program to enhance 120,300 acres of existing public and private seasonal wetland habitat consistent with the goals of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	E121502	Improve and manage seasonal wetland habitat throughout the ecological management zone.
	West San Joaquin Basin	Evaluate the feasibility of creating or improving seasonal wetland habitats.	E141501	Acquire lands adjacent to existing seasonal wetlands from willing sellers or conservation easements.
		Provide 150,000 af of water to existing wetlands to improve waterfowl habitat.	E141502	Prove water to wetlands on a seasonal basis from the California Aqueduct, Delta Mendota Canal, or other source.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15d. Restoration of up to 5,932 acres of riparian and shaded riverine aquatic (SRA) habitat; protection and enhancement of up to 1,000 acres of riparian habitat in meander zones along San Joaquin River tributaries; protection, enhancement, and restoration of riparian habitat and SRA cover along up to 75 miles of channels in other reaches of the San Joaquin River and its tributaries; and reduction of populations of non-native invasive plants along the northern tributaries to the San Joaquin River.	Eastside Delta Tributaries	Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.	E110401	As needed, restore stream channel and overflow basin configurations within the floodplain.
		Restore a minimum of 1,240 acres of self-sustaining or managed diverse natural riparian habitat along the Mokelumne River and protect existing riparian habitat.	E111601	Develop a cooperative program to restrict further riparian vegetation removal, and establish a riparian corridor protection zones.
			E111602	Develop a cooperative program to implement riparian restoration activities.
			E111603	Encourage improved land-management practices and livestock grazing practices along stream riparian zones.
		Restore a minimum of 1,240 acres of self-sustaining or managed diverse natural riparian habitat along the Calaveras River and protect existing riparian habitat.	E111604	Purchase streambank conservation easements from willing sellers to widen riparian corridors.
			E111605	Develop a cooperative program to restore riparian woodlands along the entire Mokelumne River.
			E111606	Develop a cooperative program to restrict further riparian vegetation removal, and establish riparian corridor protection zones.
			E111607	Develop a cooperative program to implement riparian restoration activities.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15d. Restoration of up to 5,932 acres of riparian and SRA habitat; protection and enhancement of up to 1,000 acres of riparian habitat in meander zones along San Joaquin River tributaries; protection, enhancement, and restoration of riparian habitat and SRA cover along up to 75 miles of channels in other reaches of the San Joaquin River and its tributaries; and reduction of populations of non-native invasive plants along the northern tributaries to the San Joaquin River.	Eastside Delta Tributaries	Restore a minimum of 1,240 acres of self-sustaining or managed diverse natural riparian habitat along the Calaveras River and protect existing riparian habitat.	E111608	Encourage improved land management practices and livestock grazing practices along stream riparian zones.
			E111609	Purchase streambank conservation easements from willing sellers to widen riparian corridors.
			E111610	Develop a cooperative program to restore riparian woodlands along the entire Calaveras River.
		Restore a minimum of 1,240 acres of self-sustaining or managed diverse natural riparian habitat along the Cosumnes River and protect existing riparian habitat.	E111611	Develop a cooperative program to restrict further riparian vegetation removal, and establish riparian corridor protection zones.
			E111612	Develop a cooperative program to implement riparian restoration activities.
			E111613	Encourage improved land-management practices and livestock grazing practices along stream riparian zones.
			E111614	Purchase streambank conservation easements from willing sellers to widen riparian corridors.
			E111615	Develop a cooperative program to restore riparian woodlands along the entire Cosumnes River.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15d. Restoration of up to 5,932 acres of riparian and SRA habitat; protection and enhancement of up to 1,000 acres of riparian habitat in meander zones along San Joaquin River tributaries; protection, enhancement, and restoration of riparian habitat and SRA cover along up to 75 miles of channels in other reaches of the San Joaquin River and its tributaries; and reduction of populations of non-native invasive plants along the northern tributaries to the San Joaquin River.	Eastside Delta Tributaries	Reduce the adverse effects of invasive riparian plants on native species and ecosystem processes, water quality and conveyance systems, and major rivers and their tributaries.	E115301	Develop and implement a coordinated control program to reduce or eliminate exotic invasive plant species from the riparian corridor along the Cosumnes, Mokelumne, and Calaveras Rivers.
	San Joaquin River	Restore 50 stream miles of diverse, self-sustaining riparian community.	E121601	Develop a cooperative program to restrict further removal of riparian vegetation.
	East San Joaquin Basin	Set back 10 miles of levees along the San Joaquin River between the Merced River confluence and Vernalis where feasible to reestablish the hydrologic connectivity between these channels and natural floodplains.	E121602	Develop a cooperative program to restore riparian habitat.
		Preserve and expand the stream-meander belts in the Stanislaus, Tuolumne, and Merced Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E121603	Improve land-management and livestock grazing practices along streams and riparian zones.
			E124901	Develop a cooperative program to acquire or obtain easements on floodplain and riparian land needed to meet restoration goals.
			E130301	Acquire riparian and meander-zone lands by purchasing them directly or acquiring easements from willing sellers, or provide incentives for voluntary efforts to preserve and manage riparian areas on private lands.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15d. Restoration of up to 5,932 acres of riparian and SRA habitat; protection and enhancement of up to 1,000 acres of riparian habitat in meander zones along San Joaquin River tributaries; protection, enhancement, and restoration of riparian habitat and SRA cover along up to 75 miles of channels in other reaches of the San Joaquin River and its tributaries; and reduction of populations of non-native invasive plants along the northern tributaries to the San Joaquin River.	East San Joaquin Basin	Preserve and expand the stream-meander belts in the Stanislaus, Tuolumne, and Merced Rivers by adding a cumulative total of 1,000 acres of riparian lands in the meander zones.	E130302	Build local support for maintaining active meander zones by establishing a mechanism through which property owners would be reimbursed for lands lost to natural meander processes.
			E130303	Develop a cooperative program to improve opportunities for natural meander by removing riprap and relocating other structures that impair stream meander.
		On the Merced River between the towns of Cressey and Snelling, isolate gravel pits, reconfigure dredge tailings, and restore a more natural channel configuration to 5–7 miles of disturbed stream channel. On the Tuolumne River, between RMs 25 and 51, isolate 15–30 gravel pits, reconfigure dredge tailings, and restore a more natural stream channel to 6–9 miles of disturbed stream channel. On the Stanislaus River, restore a more natural stream channel to 2.5–5 miles of disturbed stream channel.	E130304	Develop a cooperative program, consistent with flood control requirements, to restore more natural channel configurations to reduce salmonid predator habitat and improve migration corridors.
			E130305	Work with permitting agencies to appropriately condition future gravel extraction permits. Coordinate the design and implementation of gravel pit isolation and stream channel configuration with USACE, local water management agencies, and local governments.
			E130306	Develop a cooperative program with the counties, local agencies, and aggregate resource industry to develop and implement gravel management programs for each of the three rivers.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15d. Restoration of up to 5,932 acres of riparian and SRA habitat; protection and enhancement of up to 1,000 acres of riparian habitat in meander zones along San Joaquin River tributaries; protection, enhancement, and restoration of riparian habitat and SRA cover along up to 75 miles of channels in other reaches of the San Joaquin River and its tributaries; and reduction of populations of non-native invasive plants along the northern tributaries to the San Joaquin River.	East San Joaquin Basin	On the Merced River between the towns of Cressey and Snelling, isolate gravel pits, reconfigure dredge tailings, and restore a more natural channel configuration to 5–7 miles of disturbed stream channel. On the Tuolumne River, between RMs 25 and 51, isolate 15–30 gravel pits, reconfigure dredge tailings, and restore a more natural stream channel to 6–9 miles of disturbed stream channel. On the Stanislaus River, restore a more natural stream channel to 2.5–5 miles of disturbed stream channel.	E130307	Develop a cooperative program to implement a salmonid spawning and rearing habitat restoration program, including reconstructing channels at selected sites by isolating or filling in in-channel gravel extraction areas.
		Restore and improve opportunities for rivers to inundate their floodplain on a seasonal basis.	E130401	As needed, restore stream channel and overflow basin configurations within the floodplain.
		Provide conditions for growth of riparian vegetation along sections of rivers in the East San Joaquin Basin Ecological Zone.	E131601	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Stanislaus River.
			E131602	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Tuolumne River.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15d. Restoration of up to 5,932 acres of riparian and shaded riverine aquatic habitat; protection and enhancement of up to 1,000 acres of riparian habitat in meander zones along San Joaquin River tributaries; protection, enhancement, and restoration of riparian habitat and SRA cover along up to 75 miles of channels in other reaches of the San Joaquin River and its tributaries; and reduction of populations of non-native invasive plants along the northern tributaries to the San Joaquin River.	East San Joaquin Basin	Provide conditions for growth of riparian vegetation along sections of rivers in the East San Joaquin Basin Ecological Zone.	E131603	Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Merced River.
		Establish four additional populations and increase the population of riparian brush rabbits by 200% over current estimates so that a census of the population would be two times higher than the current estimate of 213–312 individuals.	E134101	Reestablish 500 acres of large contiguous areas of riparian forest habitat that have dense brushy understories with adjacent upland habitat. These restored/reestablished riparian forests would have adjacent upland habitat with sufficient cover. Establish five additional populations within the species historical range; each population should have self-sustaining populations with a minimum of 250 individuals each. Maintain and establish connectivity between key habitats.
			E134103	More closely approximate the natural hydrologic regime that allows for establishment and maintenance of mature riparian forest habitat. Additionally, encourage growth of wild rose, coyote bush, blackberries, box elder, valley oak, and cottonwoods to provide habitat.
	West San Joaquin Basin	Restore 10–25 miles of stream channel, stream-meander belts, and floodplain processes along westside tributaries of the San Joaquin River.	E140401	Enter into agreements with willing landowners and irrigation districts to set back levees and allow floodplain processes such as stream-meander belts.
			E140402	Expand existing floodplain overflow basins by obtaining easements of titles from willing sellers of floodplain lands.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E15d. Restoration of up to 5,932 acres of riparian and shaded riverine aquatic habitat; protection and enhancement of up to 1,000 acres of riparian habitat in meander zones along San Joaquin River tributaries; protection, enhancement, and restoration of riparian habitat and SRA cover along up to 75 miles of channels in other reaches of the San Joaquin River and its tributaries; and reduction of populations of non-native invasive plants along the northern tributaries to the San Joaquin River.	West San Joaquin Basin	Restore 10–25 miles of stream channel, stream-meander belts, and floodplain processes along westside tributaries of the San Joaquin River.	E140403	Reduce or eliminate gravel mining and streambed altering from active stream channels.
		Restore 5 miles of riparian habitat totaling 500–1,000 acres.	E141601	Restore riparian forest habitat on lands by purchasing land from willing sellers or obtaining it via conservation easements.
E18c. Cooperative management of up to 15,290 acres of agricultural lands to enhance habitat values for waterfowl and other associated species.	San Joaquin River	Cooperatively enhance 15,290 acres of private agricultural land to support nesting and wintering waterfowl consistent with the objectives of the Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan.	121901	Increase the area of rice fields and other croplands flooded in winter and spring to provide high-quality foraging habitat for wintering and migrating waterfowl and shorebirds and associated wildlife.
	West San Joaquin Basin	Restore and maintain migration corridors of native plants that are more than one mile wide.	141901	Purchase land or conservation easements on which to restore wildlife habitat to connect existing grassland or agricultural wildlife habitat.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E22. Reduction in the adverse effects of diversions on fish.	Eastside Delta Tributaries	Install fish screens representing the best available technology and operational constraints, as necessary, to minimize losses in diversions that limit the recovery of fish populations.	E114701	Consolidate diversions, seek alternative water sources, and install a permanent fish screen at North San Joaquin Conservation District diversion on the lower Mokelumne River.
			E114702	Improve fish screens and fish bypass system at Woodbridge Dam on the lower Mokelumne River.
			E114703	Develop a cooperative program to operate temporary screens at diversions where juvenile salmon rear or during seasons when they pass the diversion site.
			E114704	Consolidate and install screens on diversions in the Cosumnes River.
	San Joaquin River	Reduce entrainment of fish and other aquatic organisms into diversions by 50%, by volume, from the Merced River confluence to Vernalis.	E124701	Develop a cooperative approach to install state-of-the-art fish screens at El Solyo, Patterson, and West Stanislaus Irrigation District diversions.
		Eliminate the loss of adult fall-run chinook salmon straying into the San Joaquin River upstream of the Merced River confluence.	E124702	Continue to annually install a temporary weir on the San Joaquin River immediately upstream from the confluence with the Merced River to block adult salmon migration.
	East San Joaquin Basin	Reduce entrainment of fish and other aquatic organisms into diversions to a level that will not impair restoration of salmon and steelhead by screening 50% of the water diverted, by volume, in the basin.	E134701	Improve the efficiency of existing diversion screens on the lower Merced River.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E22. Reduction in the adverse effects of diversions on fish.	East San Joaquin Basin	Reduce entrainment of fish and other aquatic organisms into diversions to a level that will not impair restoration of salmon and steelhead by screening 50% of the water diverted, by volume, in the basin.	E134702	Provide alternative sources of water to diverters legally diverting water from spawning and rearing areas of the three streams.
			E134703	Purchase water rights from diverters whose diversions entrain significant numbers of juvenile salmon or steelhead.
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement.	Eastside Delta Tributaries	Improve anadromous fish passage at dams and diversion structures.	E114801	Cooperatively improve fish passage at Woodbridge Irrigation District (WID) diversions and Lake Lodi on the lower Mokelumne River.
			E114802	Cooperatively isolate the City of Lodi's Recreational Lake Lodi on the lower Mokelumne River to improve adult salmon and steelhead passage and juvenile fish survival.
			E114803	Develop a cooperative program to provide fish passage at temporary irrigation dams in the Calaveras River, Mormon Slough, and the Stockton Diverting Canal.
			E114804	Develop a cooperative program to install fish passage facilities at Bellota Weir, Clements Dam, and Cherryland Dam on the Calaveras River and provide passage flows.
		Eliminate the loss of adult fall-run chinook salmon that stray into the San Joaquin River upstream of the Merced River confluence.	E134801	Develop a cooperative program to eliminate blockage of upstream-migrating fall-run chinook salmon and steelhead at temporary irrigation diversion dams erected during the irrigation season.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement.	Eastside Delta Tributaries	Eliminate the loss of adult fall-run chinook salmon that stray into the San Joaquin River upstream of the Merced River confluence.	E134802	Continue to annually install a temporary weir on the San Joaquin River immediately upstream of the confluence with the Merced River to block adult salmon migration.
		Reduce level of predation on juvenile salmonids below Woodbridge Dam on the lower Mokelumne River.	E115601	Develop a cooperative program to modify the stream channel and to rebuild the Woodbridge Dam fish passage and diversion screening facilities to minimize losses of downstream-migrating salmon and steelhead while maintaining other important attributes.
			E115602	Modify and improve the fish-bypass discharge at Woodbridge Dam.
		Reduce adverse effects of non-native fish species that have a significant effect on juvenile salmon production in the rivers.	E135601	Eliminate gravel pits within or connected to the rivers.
		Develop harvest management strategies that allow the spawning population of wild, naturally produced fish to attain levels that fully utilize existing and restored habitat and allow harvest to be focused on hatchery-produced fish.	E115801	Reduce or eliminate the illegal harvest of salmon and steelhead by increasing enforcement efforts.
			E115802	Reduce harvest of wild, naturally produced steelhead populations where necessary by marking hatchery-produced fish and instituting a selective fishery.
			E135801	Control illegal harvest through increased enforcement efforts.
			E135802	Reduce harvest of wild, naturally produced steelhead populations where necessary by marking hatchery-produced fish and instituting a selective fishery.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E23. Improvement in passage of anadromous fish to and from spawning areas and reduction in levels of fish straying as a result of reducing the effects of structural impediments to fish movement.	Eastside Delta Tributaries	Employ methods to limit straying and loss of genetic integrity of wild and hatchery-supported stocks.	E115901	Rear hatchery salmon and steelhead in hatcheries on natal streams to limit straying.
			E115902	Limit stocking of salmon and steelhead fry and smolts to natal watersheds to minimize straying that may compromise the genetic integrity of naturally producing populations.
			E115903	Develop a plan to phase out the importation of egg or fry chinook salmon and steelhead to the Mokelumne River.
			E135901	Rear hatchery salmon and steelhead in hatcheries on natal streams to limit straying.
			E135902	Limit stocking of salmon and steelhead fry and smolts to natal watersheds to minimize straying that may compromise the genetic integrity of naturally producing populations.
E27b. Reduction in the concentrations and loadings of contaminants in the aquatic environment.	Eastside Delta Tributaries	Restore and maintain water quality in Camanche Reservoir on the Mokelumne River.	E115701	Support the East Bay Municipal Utility District (EBMUD) in developing operating regimes at Pardee and Camanche Reservoirs that optimize water quality below Camanche Dam.
			E115702	Support implementation of the cooperative agreement for the long-term remediation of Penn Mine.
			E115703	Develop an integrated program to coordinate and minimize agricultural pesticide and herbicide use in areas that drain into the Mokelumne River.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E27b. Reduction in the concentrations and loadings of contaminants in the aquatic environment.	Eastside Delta Tributaries	Reduce the input of nonpoint-source contaminants into the Mokelumne River.	E125701	Provide additional funding to enforce State laws regarding point- and nonpoint-source pollution.
			E125702	Develop a cooperative program to strengthen water quality standards as needed.
E29. Enhancement of habitat conditions for the riparian brush rabbit in occupied habitat areas at and near Caswell State Park on the Stanislaus River.	East San Joaquin Basin	Establish four additional populations and increase the population of riparian brush rabbits by 200% over current estimates so that a census of the population would be two times higher than the current estimate of 213–312 individuals.	E134101	Reestablish 500 acres of large contiguous areas of riparian forest habitat that have dense brushy understories with adjacent upland habitat. These restored/reestablished riparian forests would have adjacent upland habitat with sufficient cover. Establish five additional populations within the species historical range; each population should have self-sustaining populations with a minimum of 250 individuals each. Maintain and establish connectivity between key habitats.
			E134102	Prohibit ground cover and litter removal to allow for dense brushy and herbaceous areas of a minimum size of 550 square yards within the riparian forest.
			E134103	More closely approximate the natural hydrological regime that allows for establishment and maintenance of mature riparian forest habitat. Additionally, encourage growth of wild rose, coyote bush, blackberries, elderberries, wild grape, box elder, valley oak, and cottonwoods to provide habitat.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
E29. Enhancement of habitat conditions for the riparian brush rabbit in occupied habitat areas at and near Caswell State Park on the Stanislaus River.	East San Joaquin Basin	Establish four additional populations and increase the population of riparian brush rabbits by 200% over current estimates so that a census of the population would be two times higher than the current estimate of 213–312 individuals.	E134104	Provide high ground adjacent to current and expanded habitat with cover for protection from floods. Existing flood control levees adjacent to the park could be utilized for this escape habitat in this area to provide sufficient vegetative growth of grasses, forbs, and shrubs to lower predation pressure during these times.
			E134105	Provide fire breaks around current and expanded habitat to protect habitat destruction due to wildfire and control feral cat and dog population with yearly control efforts within and adjacent to the Park. Prohibit dogs within Caswell Memorial State Park.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Water Quality Program				
Q4. Reduction of pesticide loadings in the aquatic environment.	San Joaquin River	Reduce concentrations of pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q120501	<p>Support conservation efforts to help achieve the Water Quality Program objectives. Develop and implement best management practices (BMPs). On-farm conservation practices could include installation or implementation of the following features:</p> <ul style="list-style-type: none"> • tailwater ditch tarps, • land leveling, • cutback stream, • surge irrigation, • sprinkler germination, • drip irrigation, • shortened length of run, • gated surface pipe, • vegetated filter strip, • cover crop, • grassed waterway, • conservation tillage, • sediment basin, • tailwater return system, • irrigation management, • nutrient management, • integrated pest management, and • tailwater management.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q5. Management of salinity levels in the aquatic environment to improve water quality.	San Joaquin River	Reduce or manage salinity in the San Joaquin River and in the Delta Region to meet water quality objectives by such means as improving flow patterns using flow barriers, real-time management and increasing the assimilative capacity of the river through the Delta Mendota Canal circulation.	Q120601	Support on-farm conservation practices to treat drainage water, reduce salt loadings, reduce agricultural drainage water volume through improving management of irrigation systems; adopting new or improving existing irrigation practices, including shortening furrows; and improving irrigation scheduling.
Q1. Reduction of oxygen-depleting substances in the aquatic environment.	East San Joaquin Basin	Eliminate the low intersubstrate dissolved oxygen concentrations that affect salmon spawning and rearing habitat and establish full salmon spawning and rearing activity.	Q130101	Possible management actions include gravel-enhancement programs, channel restoration programs, development of river-corridor assessments and management strategies, and regulation of high-water temperature reservoir releases.
Q2. Maintain pathogen loadings below maximum allowed levels and reduce levels of total organic carbon (TOC), bromide, and total dissolved solids (TDS) to increase the availability of water for beneficial uses.	East San Joaquin Basin	Decrease levels of nutrients, pathogens, nonseawater TDS, and TOC in drinking water supplies.	Q130201	Establish a watershed management program for the San Joaquin River.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q4. Reduction of pesticide loadings in the aquatic environment.	East San Joaquin Basin	Reduce concentrations of pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q130501	<p>Support conservation efforts to help achieve the Water Quality Program objectives. Develop and implement BMPs. On-farm conservation practices could include installation or implementation of the following features:</p> <ul style="list-style-type: none"> • tailwater ditch tarps, • land leveling, • cutback stream, • surge irrigation, • sprinkler germination, • drip irrigation, • shortened length of run, • gated surface pipe, • vegetated filter strip, • cover crop, • grassed waterway, • conservation tillage, • sediment basin, • tailwater return system, • irrigation management, • nutrient management, • integrated pest management, and • tailwater management.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q7. Reduction of cadmium, copper, and zinc loadings to levels which do not adversely effect Bay-Delta species or beneficial uses of water.	East San Joaquin Basin	Reduce metal loading of the Bay-Delta and its tributaries to levels that do not adversely affect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q130801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
			Q130802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.
Q8. Reduction of sediment loadings to levels that do not adversely affect beneficial uses of surface water.	East San Joaquin Basin	Reduce sediment in areas to the degree that sediment does not cause negative impacts on beneficial uses of the surface water, including ecosystem benefits and municipal uses.	Q130901	Develop and implement land use BMPs, particularly along tributary watercourses, to reduce soil erosion and fine sediment inputs.
			Q130902	Manage floodplains to help diminish the negative impact of fine sediment loads from anthropogenic sources by facilitating natural deposition on floodplain surfaces.
Q2. Maintain pathogen loadings below maximum allowed levels and reduce levels of TOC, bromide, and TDS to increase the availability of water for beneficial uses.	West San Joaquin Basin	Decrease levels of nutrients, pathogens, nonseawater TDS, and TOC in drinking water supplies.	Q140201	Implement a watershed management program within the South Bay Aqueduct proper.
			Q140202	Develop and implement watershed management programs for Clifton Court and Bethany Reservoir to address nutrients and pathogens.
			Q140203	Establish a watershed management program for the San Joaquin River.
			Q140204	Control drainage of stormwaters into the aqueduct by physical modification of facilities.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q2. Maintain pathogen loadings below maximum allowed levels and reduce levels of TOC, bromide, and TDS to increase the availability of water for beneficial uses.	West San Joaquin Basin	Decrease levels of nutrients, pathogens, nonscawater TDS, and TOC in drinking water supplies.	Q140205	Develop and implement a watershed management program to minimize drainage into the aqueduct.
Q4. Reduction of pesticide loadings in the aquatic environment.	West San Joaquin Basin	Reduce concentrations of pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q140501	<p>Support conservation efforts to help achieve the Water Quality Program objectives. Develop and implement BMPs. On-farm conservation practices could include installation or implementation of the following features:</p> <ul style="list-style-type: none"> • tailwater ditch tarps, • land leveling, • cutback stream, • surge irrigation, • sprinkler germination, • drip irrigation, • shortened length of run, • gated surface pipe, • vegetated filter strip, • cover crop, • grassed waterway, • conservation tillage, • sediment basin, • tailwater return system, • irrigation management, • nutrient management, • integrated pest management, and • tailwater management.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q4. Reduction of pesticide loadings in the aquatic environment.	West San Joaquin Basin	Reduce concentrations of pesticides in biota in the San Joaquin and Sacramento Rivers and the Delta.	Q140502	Support projects which will recreate the stream channels and increase the size of flow structures, such as culverts, to help achieve reduction in pesticides.
Q5. Management of salinity levels in the aquatic environment to improve water quality.	West San Joaquin Basin	Reduce or manage salinity in the San Joaquin River and in the Delta Region to meet water quality objectives by such means as improving flow patterns using flow barriers, real-time management and increasing the assimilative capacity of the river through the Delta Mendota Canal circulation.	Q140601	Support on-farm conservation practices to treat drainage water, reduce salt loadings, reduce agricultural drainage water volume through improving management of irrigation systems; adopting new or improving existing irrigation practices, including shortening furrows; and improving irrigation scheduling.
			Q140602	Prepare salt reduction plans for each source of TDS (prepare water conservation plans and drainage and wastewater operation plans); provide incentives for water conservation and drainage water use; improve irrigation methods, irrigation management, and sequential reuse of drainage water (to improve water use efficiency and remove salt); and use sprinkler irrigation combined with furrow irrigation to reduce drainage volume to reduce short-term salt loading.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q6. Reduction in selenium concentrations and loadings to the aquatic environment.	West San Joaquin Basin	Reduction in the impairment of environment beneficial uses of water that is associated with selenium concentrations and loadings.	Q140701	Treat agricultural drainage water to remove selenium through processes that include ion exchange, reverse osmosis, reduction with zero-valent iron, reduction with ferrous hydroxide, reduction with bacteria and other algal-bacterial treatments, on-farm management practices, volatilization from evaporation ponds and drainage reuse systems, and flow-through wetlands.
			Q140702	Encourage the development and use of alternative cropping and irrigation practices that will reduce subsurface drainage volumes as well as selenium discharges.
			Q140703	Encourage and support the use of a tradable loads program, as well as other economic incentives such as tiered-water pricing, as a means to achieve selenium load reductions. CALFED should work with the Grassland Area Farmers to build upon the results of their program.
			Q140704	Implement a program to retire lands to help meet water quality objectives for selenium under a tiered approach if needed to achieve selenium loading reduction objectives. Initially, up to 3,000 acres of lands with the greatest concentrations of selenium present in agricultural drainage would be targeted for retirement. If 3,000 acres is still inadequate to meet program goals, retirement would be expanded up to a total of 37,400 acres of lands with high selenium concentrations.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Q6. Reduction in selenium concentrations and loadings to the aquatic environment.	West San Joaquin Basin	Reduction in the impairment of environment beneficial uses of water that is associated with selenium concentrations and loadings.	Q140705	Reduce selenium loads from refineries to reduce selenium concentrations in biota to levels below human-health advisories.
			Q140706	Reduce selenium loads from refineries to reduce selenium concentrations in biota to levels below ecological-risk guidelines.
Q7. Reduction of cadmium, copper, and zinc loadings to levels that do not adversely effect Bay-Delta species or beneficial uses of water.	West San Joaquin Basin	Decrease levels of nutrients, pesticides, pathogens, nonseawater TDS, and TOC in drinking water supplies.	Q140707	Reduce selenium loads from refineries through treatment of waste streams, use of alternative crude oil, sour water reuse, and wetland discharge treatment.
		Reduce metal loading of the Bay-Delta and its tributaries to levels that do not adversely affect aquatic habitat and other beneficial uses of Bay-Delta estuary waters and species dependent on the estuary.	Q140801	Remedial activities for cleanup of mines should be implemented as deemed appropriate by impacts to habitat and feasibility of remediation.
			Q140802	CALFED should participate with municipalities on the Brake Pad Consortium and other urban stormwater programs to assist in source reduction.
Water Use Efficiency Program				
W1. Support implementation of water management techniques that increase the effectiveness of water use management and efficiency for agricultural uses.	All zones	Support implementation of water management techniques that increase the effectiveness of water use management and efficiency for agricultural uses.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
W2. Support implementation of measures that increase agricultural production per unit of water used, protect water quality, or increase environmental benefits while meeting agricultural needs.	All zones	Support implementation of measures that increase agricultural production per unit of water used, protect water quality, or increase environmental benefits while meeting agricultural needs.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
W3. Provide urban water agencies with planning and technical assistance, financing assistance, and assurances for development and implementation of water management plans and BMPs.	All zones	Provide urban water agencies with planning and technical assistance, financing assistance, and assurances for development and implementation of water management plans and BMPs.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
W4. Support development and implementation of water recycling projects.	All zones	Support development and implementation of water recycling projects.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
Water Transfer Program				
T1. Implement a framework of actions, policies, and processes that will facilitate transfers and the further development of a statewide water transfer market.	All zones	Implement a framework of actions, policies, and processes that will facilitate transfers and the further development of a statewide water transfer market.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Watershed Management Program				
M1. Fund and implement watershed restoration, maintenance, conservation, and monitoring activities.	All zones	Fund and implement watershed restoration, maintenance, conservation, and monitoring activities.	None.	Specific program actions have not yet been identified. The focus of the program is primarily in the upper watersheds of the Bay-Delta and, therefore, outside of the geographic scope of the MSCS. The potential impacts of implementing the program have been analyzed in the Programmatic EIS/EIR.
Storage Facilities Program				
S1. Construct and operate enlarged or new surface water storage facilities.	East San Joaquin Basin and West San Joaquin Basin Zones, and watershed lands adjacent to these zones	Construct and operate enlarged or new surface water storage facilities.	None.	Construct and operate new or enlarge existing surface water storage reservoirs.
S2. Construct and operate new groundwater storage facilities.	East San Joaquin Basin and watershed lands adjacent to the San Joaquin River Zone	Construct and operate new groundwater storage facilities.	None.	Construct and operate new groundwater storage facilities.

Table B-4. Continued

Summary Programmatic Action Outcome	Ecological Management Zone	Program Target	Action Code	Programmatic Actions
Conveyance and Storage Operations				
01. Implement operating criteria needed to improve water management for beneficial uses.	All zones	None.	None.	No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.
02. Implement a Water Management Strategy to provide operational flexibility to achieve environmental benefits.		Implement a Water Management Strategy to provide operational flexibility to achieve environmental benefits.		No discrete actions have been identified, but a range of possible effects has been identified and analyzed in the Programmatic EIS/EIR, and the MSCS uses or incorporates the Programmatic EIS/EIR analysis.

Notes:

Targets and actions are derived from the February 1999 revision of CALFED plans.

Acronyms:

af	acre-feet
BMP	best management practice
cfs	cubic feet per second
DFG	California Department of Fish and Game
EBMUD	East Bay Municipal Utility District
EIR/EIS	Environmental Impact Report/Environmental Impact Statement
ERP	Ecosystem Restoration Program
MSCS	Multi-Species Conservation Strategy
OC	organic carbon
POA	Principles of Agreement
RM	river mile
SRA	shaded riverine aquatic
TDS	total dissolved solids
TOC	total organic carbon
USACE	U.S. Army Corps of Engineers
WID	Woodbridge Irrigation District